NSF 24-565: NSF Regional Innovation Engines

Program Solicitation

Document Information

Document History
- **Posted:** April 16, 2024

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National Science Foundation
Directorate for Technology, Innovation and Partnerships
　Innovation and Technology Ecosystems

Letter of Intent Due Date(s) *(required)* (due by 5 p.m. submitting organization's local time):

June 18, 2024

Preliminary Proposal Due Date(s) *(required)* (due by 5 p.m. submitting organization's local time):

August 06, 2024

Full Proposal Deadline(s) (due by 5 p.m. submitting organization's local time):

February 11, 2025

> Only invited teams are eligible to submit full proposals. Teams can expect to receive invitations to submit full proposals in mid-October 2024. This is a tentative timeline and is subject to change based on the number and quality of received proposals.

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Important Information And Revision Notes

1. This solicitation replaces NSF Regional Innovation Engines Broad Agency Announcement (BAA), Notice ID - *NSFBAA-ENGINES-2022-05-1*. The mission of the NSF Engines program remains the same: to accelerate the development of sustainable, inclusive, and geographically diverse regional innovation ecosystems that advance key technologies and address pressing regional, national, societal, and/or geostrategic challenges.

2. Invited full proposals submitted in response to this solicitation may be submitted via Research.gov or Grants.gov, however **due to the complexity of this program, use of Research.gov is strongly recommended**.

3. This solicitation is only for NSF Engines proposals (previously called Type-2 proposals). Proposals for NSF Engines Development proposals (previously called Type-1 proposals) will not be considered.

4. Tribal Nations and state and local government agencies are now eligible to submit proposals as the lead organization.

5. Proposals that may impact the resources or interests of a federally recognized American Indian or Alaska Native Tribal Nation (Tribal Nation) will not be awarded by NSF without prior written approval from the official(s) designated by the relevant Tribal Nation(s). See NSF PAPPG Chapter II.E.10 for instructions.

6. Proposing teams (lead organization and/or core partners) that received one or more NSF Engine Development Award(s) must identify the development award(s).

7. Concept Outlines are not required. Instead, Letters of Intent (LOIs) are required in advance of the submission of a preliminary proposal. To encourage formation of teams within overlapping regions, LOI information will be published on the NSF Engines website.

8. Preliminary proposals are required prior to the submission of a full NSF Engines proposal to ease the proposer and reviewer burden and provide constructive feedback earlier in the process. NSF will select only a subset of preliminary proposals to be invited to submit a full NSF Engines proposal.

9. An organization is only permitted to submit one LOI, one preliminary proposal, and one full proposal as the lead organization.

10. Preliminary and full proposals are required to include a letter of commitment from the senior official (e.g., President of institution of higher education, CEO of for-profit corporation, Executive Director of no-profit) of the

lead organization that includes a description of the support to be provided and a commitment to provide such support should the proposed NSF Engine should it be funded.

11. Preliminary proposals are required to include a minimum of four but no more than six letters of collaboration from major regional stakeholders verifying the nature of their participation and include a description of the resource support (cash and/or in-kind) to be provided and a commitment to provide such support should the proposed NSF Engine be funded.

12. Full proposals must include a letter of collaboration from each core partner and from each stakeholder who will provide substantive support, facilities, equipment, and/or other resources (cash or in-kind) to the proposed NSF Engine. Letters of collaboration must describe the nature of the collaboration and must include a description of the resources (cash and/or in-kind) to be provided and a commitment to provide such support should the proposed NSF Engine be funded.

13. NSF's definition of a region of service has been clarified, along with considerations for geographical size. See Section II.B.2 of this solicitation for additional details.

14. This solicitation strengthens the focus on engagement of all individuals within a region, regardless of background, socioeconomic status, or location. Teams are asked to describe plans to reach untapped populations and bring benefits to under-served communities. Evidence of meaningful community engagement and ongoing efforts at inclusive stakeholder alignment are highlighted in many sections as critical to the future success of an Engine.

15. For both the preliminary and full proposals, this solicitation requires proposing teams to document the amount (in dollars) of existing and new resources (cash and/or in-kind) to be made available to the proposed NSF Engine by partners and stakeholders. This information will be compiled using the Existing and New Resources Spreadsheet Template, and submitted as a supplementary document. See Section V for submission instructions.

16. This solicitation organizes Engines' strategic and implementation plans, efforts, and initiatives around seven key drivers of ecosystem change:

    a. Cross-sector Partnerships and Stakeholder Alignment;

    b. Use-inspired Research and Development (R&D);

    c. Translation of Innovation to Practice;

    d. Workforce Development;

    e. Inclusive Engagement;

    f. Strategic Investment; and

    g. Governance and Management.

17. For both preliminary and full proposals, proposing teams are required to submit as part of the proposal and via email three distinct Microsoft Excel spreadsheets as supplementary documents: (i) Consolidated Personnel List Spreadsheet, (ii) Existing and New Resources to be Made Available for the Project, and (iii) a Region of Service Map. For detailed instructions, see the Supplementary Documents sub-sections of the proposal preparation instruction sections (for both the preliminary and full proposals) in this solicitation.

Any proposal submitted in response to this solicitation should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) that is in effect for the relevant due date to which the proposal is being submitted. The NSF PAPPG is regularly revised and it is the responsibility of the proposer to ensure that the proposal meets the requirements specified in this solicitation and the applicable version of the PAPPG. Submitting a proposal prior to a specified deadline does not negate this requirement.

Summary Of Program Requirements

General Information

Program Title:

NSF Regional Innovation Engines (NSF Engines)

Synopsis of Program:

The NSF Regional Innovation Engines (NSF Engines) program creates regional-scale, technology-driven, inclusive innovation ecosystems throughout the United States by accelerating key technologies, addressing regional, national, societal, and/or geostrategic challenges, driving economic growth, creating and retaining quality jobs, expanding equitable pathways into careers, and strengthening national competitiveness and security. Each NSF Engine represents a formal coalition of regional partners, led by a full-time Chief Executive Officer (CEO), tasked to carry out an integrated and comprehensive set of activities spanning use-inspired research, translation of innovation to practice, entrepreneurship, workforce development, community engagement, and ecosystem building, to nurture and accelerate the growth of regional innovation ecosystems grounded in technological innovation and regional, national, societal, and/or geostrategic challenges. The mission of an NSF Engine must be clearly rooted in regional interests and reflect the aspiration that a regional innovation ecosystem can help build strong communities where all residents can thrive. This includes the equitable development of regional talent, intentional community engagement, and attention to impacts on a region's identities and cultures. The NSF Engines program is a placed-based innovation funding initiative, where the emphasis on "regions" expresses NSF's aim to stimulate innovation-driven economic growth within a particular place or region of service. The emphasis of the NSF Engines program further includes creating new business and economic growth in sectors that are critical to American competitiveness and in those regions of America that have not fully participated in the technology boom of the past several decades.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- NSF Engines Program Team, telephone: (703) 292-7463, email: engines@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering (ENG)
- 47.049 --- Mathematical and Physical Sciences (MPS)
- 47.050 --- Geosciences (GEO)
- 47.070 --- Computer and Information Science and Engineering (CISE)
- 47.074 --- Biological Sciences (BIO)
- 47.075 --- Social Behavioral and Economic Sciences (SBE)
- 47.076 --- STEM Education (EDU)
- 47.079 --- Office of International Science and Engineering (OISE)
- 47.083 --- Office of Integrative Activities (OIA)
- 47.084 --- NSF Technology, Innovation and Partnerships (TIP)

Award Information

Anticipated Type of Award:

Cooperative Agreement

Estimated Number of Awards:

The overall number of awards will be determined by the number of high-quality proposals received and the availability of funds appropriated by Congress. NSF Engines can be funded for up to ten years, with an initial award for the first two

years and subsequent awards for years 3-5 and 6-10, based on performance reviews and evaluations.

Anticipated Funding Amount:

See Section V (Full Proposal Preparation Instructions) of this solicitation for additional information about the allowable maximum annual budget for years one through ten of each award.

Each NSF Engine can receive funding for up to 10 years. The initial two years of funding will support a ramp-up period. Continued support for an NSF Engine will be contingent upon its overall performance, including meeting its annual performance goals.

During the ramp-up period, an NSF Engine can be funded for a total of $15,000,000 over two years. The total amount of an NSF Engine award will not exceed $160,000,000 from NSF (over a period not exceeding ten years).

Beyond Year 1, NSF will annually conduct a comprehensive assessment of the NSF Engine's performance, which will inform subsequent-year funding. A determination that the NSF Engine has failed to perform during an NSF annual review may result in termination of the award.

The budget distribution among the lead and core partners should be appropriate for the scope of work and activities planned for each of the key drivers of ecosystem change, as defined in Section II.B.3 of this solicitation.

The NSF Engines program retains the right to fund submitted proposals as NSF Engines Development awards – awards designed to enable recipients the additional time and funding to lay the additional groundwork needed to launch a full-scale NSF Engine – based on the outcomes of the merit review process. In exercising this right, NSF reserves the option to fund only a subset of activities described in the proposal, including the funding of only the partnership development and/or network formation aspects of the project.

Co-funding:

NSF may enter into partnerships with other agencies, foundations, and organizations interested in co-funding NSF Engines projects submitted to this solicitation. A PI identified on a proposal that meets the general eligibility requirements of one or more of these partners may be contacted by the cognizant NSF program director following submission of his/her proposal and be given the option of having his/her proposal considered jointly by NSF and the partner(s). If a PI so chooses, a given partner's representatives may have access to the corresponding proposal, may be invited to sit in on the NSF review panel's discussion of that proposal and may be able to discuss the reviews with the NSF Engines program directors. This consideration by one or more partners will be strictly optional; a PI who chooses not to avail themselves of this option will have his/her proposal reviewed solely by NSF. Once NSF's decisions on funding have been made, relevant partner(s) will be able to choose to co-fund any of the awards submitted for their consideration.

An updated list of partners, including partner-specific eligibility requirements, will be maintained on the NSF Engines program webpage.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.

- Non-profit, non-academic organizations: Independent museums, observatories, research laboratories, professional societies and similar organizations located in the U.S. that are directly associated with educational or research activities.
- For-profit organizations: U.S.-based commercial organizations, including small businesses, with strong capabilities in scientific or engineering research or education and a passion for innovation.
- Tribal Nations: An American Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges as a federally recognized tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. §§ 5130-5131.
- State and Local Governments

Who May Serve as PI:

The Principal Investigator (PI) must be a senior member of the submitting organization's leadership and will also serve as the full-time CEO for the NSF Engine. At the time of proposal submission, this role may be filled by an interim CEO until a full-time CEO is named or recruited. The designation of a full-time CEO must occur within the first six months of the start date of the award.

Individuals who are a party to a Malign Foreign Talent Recruitment Program are not eligible to serve as a senior/key person on an NSF proposal or award.

Limit on Number of Proposals per Organization: 1

An organization may submit no more than one Letter of Intent (LOI), one preliminary proposal, and one full proposal in response to this solicitation as the lead organization. If an organization exceeds this limitation, LOIs, preliminary proposals, and full proposals will be accepted based on earliest date and time of submission (i.e., the first proposal will be accepted, and the remainder will be returned without review). A lead organization on a proposal may be a sub-recipient on a different proposal. There is no limit on the number of proposals for which an organization can serve as a sub-recipient

Additional Guidance for proposers new to NSF: Any proposer who has not submitted a proposal to NSF within the previous five years, must review the guidance for new and returning proposers in the NSF New Proposer Submission – Supplementary Guidance document, which provides a timeline and walk-through of the key milestones that must be completed in order to submit proposals to NSF.

The lead organization must have a Unique Entity Identifier (UEI) and be fully registered at SAM.gov at the time of LOI submission. Personnel designated as a PI or co-PI must have an NSF ID at the time of LOI submission. The Lead organization and all sub-recipients must have an active UEI number and must be registered with NSF to submit a Full NSF Engines Proposal. To register your organization with NSF, visit https://www.research.gov. To find or request a Unique Entity Identifier (UEI), please visit https://sam.gov/content/home. Any individual designated as Senior/Key Personnel is required to have an NSF ID.

Limit on Number of Proposals per PI or co-PI: 1

An individual may serve as PI or co-PI on no more than one proposal submitted in response to this solicitation.

Individuals who are a party to a Malign Foreign Talent Recruitment Program are not eligible to serve as a senior/key person on an NSF proposal or award.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposals:**
  - Full Proposals submitted via Research.gov: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
  - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

  Inclusion of voluntary committed cost sharing is prohibited.

- **Indirect Cost (F&A) Limitations:**

  Not Applicable

- **Other Budgetary Limitations:**

  Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Letter of Intent Due Date(s)** *(required)* (due by 5 p.m. submitting organization's local time):

  June 18, 2024

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Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements:

Additional reporting requirements apply. Please see the full text of this solicitation for further information.

I. Introduction

The National Challenge. Innovations in science and engineering have enabled the U.S. to become a world-leading economy, powered by a well-trained scientific and technical workforce. With recent advances in multiple areas of science and technology unleashing waves of innovation around the globe, the U.S. is now facing competition from many countries, with major implications for economic and industrial competitiveness as well as national security. To ensure the U.S. remains at the vanguard of competitiveness, the U.S. must rapidly expand its innovation capacity. Currently thriving research and development (R&D)-based innovation activity is highly concentrated in only a few geographic regions of the country. While these activities have yielded significant economic and societal benefits through use-inspired research and technology development, the U.S. must develop and leverage geographic and demographic diversity across the nation, ensuring that all people and regions are able to flourish – including ensuring equitable pathways and access for untapped populations that are historically underrepresented in STEM fields and innovation ecosystems. NSF Engines program uniquely harnesses the nation's science and technology research and development enterprise and regional-level resources.

NSF's Unique Role. As part of its mission, NSF plays a pivotal role in driving the Nation's scientific and engineering progress from initial discovery to innovation. Many of the technologies and industries that are the focus of national conversations around U.S. competitiveness, including artificial intelligence (AI), advanced manufacturing, advanced materials, advanced wireless, biotechnology, and quantum information science (QIS), are rooted in sustained NSF support for research at the frontiers of science and engineering over many decades. Moreover, NSF has a proven track record of advancing research outcomes to commercialization and societal impact, while successfully bridging the interests of academia, government, and industry, including startups and small businesses. For example, NSF established the first Small Business Innovation Research (SBIR) program within the Federal Government in 1977; today, this program, known as America's Seed Fund, has been Congressionally mandated across 10 other federal agencies. NSF also pioneered the Innovation Corps (I-Corps™) program in 2011; over the last decade, the program has been adopted by other federal agencies as well as state governments. In addition, NSF has been a strong advocate of addressing research-investment gaps across regions, institution types, and communities traditionally under-served in STEM through programs such as the Established Program to Stimulate Competitiveness in Research (EPSCoR), Growing Research Access for Nationally Transformative Equity and Diversity (GRANTED), and the Eddie Bernice Johnson NSF INCLUDES Initiative (Inclusion Across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science).

In 2022, NSF established the Directorate for Technology, Innovation and Partnerships (TIP) to advance U.S. competitiveness and societal impact by nurturing partnerships that drive and accelerate diverse innovation ecosystems, technology translation and development, and workforce development. **NSF Regional Innovation Engines (NSF Engines)** represent one of the single largest, broad investments in place-based research and development in the nation's history – uniquely placing science and technology leadership as the central driver for regional economic competitiveness.

Key Definitions for the NSF Engines Program

NSF Program Solicitation	The term "program solicitation" refers to formal NSF publications that encourage the submission of proposals in specific program areas of interest to the Foundation. Proposals received in response to a solicitation compete directly with each other for NSF funding.
NSF PAPPG	The *Proposal & Award Policies & Procedures Guide* (PAPPG) is the source for information about NSF's

	proposal and award process. Each version of the PAPPG applies to all proposals or applications submitted while that version is effective. NSF PAPPG (NSF 24-1) applies to all proposals submitted or due on or after May 20, 2024, and is the effective version for this current NSF Engines Solicitation.
Region of Service	Region of Service is the contiguous geographical unit of analysis to be served by an NSF Engine, i.e., the geographical area impacted by the NSF Engines efforts and activities. Currently defined examples include commuting zones, labor market areas, metropolitan statistical areas, and ecological or geological boundaries. For the NSF Engines Program, a Region of Service may include multiple contiguous geographical units of analysis (e.g., multiple adjacent commuting zones).
Technology Readiness Levels (TRLs)	Technology readiness levels (TRLs) are a method for assessing the maturity level of technologies from initial research of basic technological principles (TRL 1) through preparation for commercialization (TRL 9). A technology project is assigned a TRL rating based on technology requirements, demonstrated technology capabilities, and progress toward commercialization. TRLs are based on a scale from 1 to 9 with 9 being the most mature technology.
Use-Inspired R&D	Use-inspired research and development (R&D) is research, technology innovations, and knowledge creation driven by the desire for practical solutions to societal challenges and user needs. The end goal of R&D is to advance products, technologies, or services to TRL maturity levels that will enable translation of the innovations. NSF Engine-supported R&D activities are expected to be based on technical and economic analyses, which should be used to evaluate economic feasibility, identify and guide R&D targets, and quantify technical and economic uncertainty and risk. Use-inspired R&D activities generally are at the maturity levels of TRL 1-5.
Translation of Innovation to Practice	Translation of Innovation to Practice are activities that support bringing products, technologies, or services to TRL maturity levels that will lead to market, whether through commercialization or open-source mechanisms. NSF Engine-supported translation activities are expected to be based on technical and economic analyses, which should be used to evaluate

	economic feasibility, guide translation strategies and methods, and quantify technical and economic uncertainty and risk. Translation activities happen at maturity levels of TRL 6-9.
Workforce Development	Workforce development is training, at all levels, that expands opportunities for untapped populations. Proposing teams must have an inclusive vision for developing new career pathways that will support the full range of technology-driven jobs of an NSF Engine, including technicians, practitioners, researchers, entrepreneurs, and beyond, thereby meeting the demands of industry partners and stakeholder communities in the region of service.
Chief Executive Officer (CEO)	The individual serving as the full-time Chief Executive Officer (CEO) of the NSF Engine. For an NSF Engine, the CEO and PI are the same individual.
Lead PI (Principal Investigator)	The individual designated by the proposing organization and approved by the Federal research funding agency, who takes direct responsibility for NSF Engine operations and goals and reporting directly to the funding agency. For an NSF Engine, the CEO and PI are the same individual.
co-Principal Investigator (co-PI)	An individual who contributes in substantive and meaningful ways to the development and/or operation of the NSF Engine. Co-PIs will typically have a leadership role within the NSF Engine.
Lead Organization	The organization who submits the proposal and is the award recipient (should an award be made). The lead organization is fully responsible for award management, including fiscal compliance and sub-recipients
Core Partners	The coalition of stakeholder organizations who constitute the NSF Engine's management and governance team, with authority to make strategic decisions and take actions. Core partners contribute significant resources (monetary, in-kind, and/or other contributions) and work in collaboration with other members of the stakeholder coalition to engage, recruit, grow, and maintain the network of partners and participating organizations. Core partners, including the lead organization, must sign a formalized partnership agreement and use the

	principles of stakeholder alignment to organize their shared work.
Other Partner Organizations	Stakeholder organizations (e.g., government, industry, entrepreneurs, capital investors, institutions of higher education, non-profit organizations, and community and labor organizations) who: (1) actively participate in or are involved in one or more NSF Engine programmatic activities; and (2) provide monetary, in-kind, and/or other contributions in support of NSF Engine activities with the aim of achieving NSF Engine goals, including innovation productivity, economic impact, and inclusive opportunities. Partners may not necessarily derive immediate commercial benefits from the collaboration. Fee-for-service work, where there is no active participation and collaboration, will not be regarded as an NSF Engines partnership.
Participating Organizations	Organizations that actively participate or collaborate in the NSF Engine's activities related to use-inspired R&D, translation of innovation to practice, workforce development, and/or other NSF Engine programmatic initiatives including inclusive engagement.
Leadership Team	The team that oversees the vision, strategy, and activities of the NSF Engine. This includes the full-time CEO and all personnel charged with key leadership roles, e.g., leading a major initiative, set of activities, or a key ecosystem driver.
Senior/Key Personnel	Specifically for purposes of the NSF Engines Program, senior/key personnel comprises the PI, co-PIs, and all members of the Leadership Team for the proposed NSF Engine. Each individual designated as senior/key personnel is required to complete/upload multiple documents that must be submitted with preliminary and full proposal submissions. See the proposal preparation section of this solicitation for a description of documents that must be submitted by each individual designated as senior/key personnel.
IHE	An Institution of Higher Education.
Cooperative Agreement	See PAPPG, Introduction, Section D, for further information.
Authorized Organizational Representative (AOR)	The administrative official who, on behalf of the proposing organization, is delegated to make certifications and representations and can commit the

	organization to the conduct of a project that NSF is being asked to support as well as adhere to various NSF policies and award requirements.

II. Program Description

II. A. Program Mission and Scope

The mission of the NSF Engines program is to accelerate the development of sustainable, inclusive, and geographically diverse *regional innovation ecosystems* that advance key technologies and address pressing regional, national, societal and/or geostrategic challenges. The program is designed to catalyze thriving place-based innovation ecosystems that function as *interdependent* networks, characterized by a coalition of stakeholders who benefit from their proximity and intentional coordination within both their topic area and region of service. This is different from a collection of siloed assets co-located within a geographic region.

To accomplish such an ambitious mission and goals, the program is looking to fund NSF Engines led by a full-time CEO and a multi-sector coalition of partner and stakeholder organizations, (e.g., government, industry, entrepreneurs, capital investors, academic institutions, non-profits, community and labor organizations) with the explicit goal of accelerating technology development for broad use and societal impact that benefit entire regions. Each NSF Engine is expected to center on a strong R&D and technology topic area and have a coalition in place that will function as an *interdependent* network to support R&D and technology innovations, trusted knowledge-sharing, resource expansion, strategic workforce development, and continuous and growing capital inflow. The NSF Engines program is particularly interested in increasing the nation's latent capacity for innovation by creating new business and economic growth opportunities in regions of America and within untapped populations and under-served communities that have not yet fully participated in the technology boom of the past several decades.

Unlike traditional NSF funding models, the NSF Engines program aims to catalyze and deepen the interactions among regional stakeholders with the explicit goal of catalyzing the establishment of a sustainable and inclusive ecosystem. The NSF Engines program is not intended to focus on support for individual investigator-driven research projects, startup ventures at a specific stage in their entrepreneurial journey, or academic research infrastructure within a topic area or state/region. Instead, the intent is to create the holistic foundation for a place-based innovation ecosystem with a support infrastructure that will leverage key drivers of change to create translation pathways that drive equitable economic and societal impacts.

Each NSF Engine must demonstrate a strong commitment to inclusively leverage the full spectrum of diverse talent that society has to offer along several dimensions (e.g., perspectives, geographies, race, ethnicity, gender, types of organizations, and community type). In support of these objectives, the NSF Engines program seeks to expand the breadth of institution types that take on leadership roles and the related regional-scale activities, such as historically Black colleges and universities, Tribal colleges and universities, minority-serving institutions, community colleges, institutions in EPSCoR jurisdictions, for-profit industry, state and local governments, Tribal nations, and other organizations not supported by NSF as often. Efforts driven by the needs and aspirations of rural-based, rural-focused stakeholder groups are encouraged, as well as projects based in metropolitan areas with evidence of strong leadership participation from suburban and/or rural partners and buy-in from a range of communities and industries in the region of service.

Funding for this program will prioritize funding for regions with less-established innovation ecosystems. Of particular interest are the establishment of NSF Engines in regions of the country where organizations, resources, and capabilities exist, but where the ecosystem is not yet functioning as an efficient, fully interdependent system. These should be regions that could benefit from NSF investment to become a national leader in their topic area with high levels of economic activity and business creation that in turn attract consistent and meaningful support from public and private sources of capital. While participating organizations in each NSF Engine should largely comprise organizations from within the NSF Engine's region of service, partners from outside of that geographical area could be appropriate to augment the resources available within the region of service. All partnerships should be relevant to the goals of the NSF Engine and their roles in the region of service must be justified. For example, mentoring from experienced organizations is

encouraged, and organizations operating in existing mature innovation ecosystems are welcome to partner with lead organizations that are based in the region of service to provide support if the benefits of such partnerships remain within the NSF Engine's region of service.

II. B. The NSF Engines Model and Key Drivers of Change

This section highlights the 10-year funding model for NSF Engines, the foundational elements of an NSF Engine, and the key drivers of ecosystem change that each NSF Engine must continuously operationalize to achieve its goal – accelerating its region into a national-leading innovation ecosystem in a proposed topic area. Proposing teams should carefully consider these components when preparing their proposals.

II. B. 1. The NSF Engines Model

The graphic below illustrates the five-phase model that underlies the NSF vision for establishing sustainable NSF Engines and accelerating the growth of associated regional innovation ecosystems over a 10-year period. All NSF Engines begin at the nascent stage and can receive up to ten years of funding. The development phase corresponds to a two-year planning award period, where regional teams solidify their strategic plans and partnerships prior to submission of a full NSF Engine proposal. Development proposals are not being considered in the current solicitation and are not a prerequisite to be eligible to submit a full NSF Engines proposal.

Development – Initial scope is defined and strategic plans are developed. The Development Phase occurs *prior* to NSF Engine funding.

Nascent Phase (2 years) – Organization and partnerships are solidified (CEO, staff, personnel hired), strategic plans and agreements put in place, and innovation activities ramp up.

Emergent Phase (3 years) – Technological products and services and workforce capabilities are scaled, and the innovation ecosystem starts to attract sizeable external funding towards promoting innovation-based economic activity.

Growth Phase (5 years) – Innovation ecosystem grows as a national leader—attracting increasing levels of economic activity and business creation—with underlying support from state, local, and federal governments.

Mature Phase – Innovation ecosystem is well-established and can sustain itself without NSF Engines funding.

II. B. 2. Building the Foundation

Operating an NSF Engine and catalyzing a regional innovation ecosystem will require teams to manage many complex and interdependent challenges. Each proposal should highlight the team's existing assets and the regional context that establishes the firm foundation for success. A team should consider how to holistically represent its strengths and regional alignments throughout the proposal.

At minimum, the following key foundational elements must be addressed:

- **Topic Area and Regional Vision:** A well-formulated strategic vision for an NSF Engine should provide direction and clarity, be ambitious and aspirational, align with regional interests, cultures, and competitive advantages, and inspire core partners to invest in achieving the mission and goals. Each NSF Engine must be centered around a transformative, future-oriented topic area and a broader regional, national, societal, and/or geostrategic challenge(s), based upon key technologies including, but not limited to, those areas defined in the CHIPS and Science Act. The selection of an appropriate topical area is a critical step in articulating a proposed NSF Engine's vision and strategic plans for the proposed region of service. Proposing teams should note that a chosen topic area must:
    - reflect the interests and needs of regional stakeholders;
    - have the potential to produce disruptive R&D and technological innovation that can lead to economic growth through the creation of new startups and the expansion of existing small businesses;
    - have demonstrated potential to serve as the basis for a financially sustainable innovation ecosystem;
    - and offer significantly increased opportunities for the creation and retention of quality jobs and equitable workforce development pathways into careers.

The proposal must clearly articulate how the NSF Engine will be a regionally driven effort and what key industries will be impacted by the proposed efforts.

- **Region of Service:** The region of service is the contiguous geographical unit of analysis to be served by an NSF Engine, i.e., the geographical area impacted by their efforts and activities. Examples of ways to define the region of service include commuting zones, labor market areas, metropolitan statistical areas, and by ecological or geological boundaries. For the NSF Engines program, a region of service may include multiple continuous geographical units of analysis (e.g., multiple adjacent commuting zones, communities within a regional watershed.) A proposal needs to demonstrate that the proposed region of service is tightly interconnected (in vision and stakeholder alignment) and has either expressed clear intent from a multi-sector regional coalition that includes regional leadership or has already previously demonstrated the capacity to collaborate, align priorities, and coordinate as a cohesive region.

  Teams should consider how the size of the region of service will impact outcomes. Choosing a large region of service (e.g., entire state(s) or multiple high-density metropolitan areas) could raise serious concerns about the ability to measure and assess tangible economic impact and intended outcomes as award funds and place-based economic indicators will be geographically diluted. A large region of service can also limit meaningful collaboration between partner institutions and stakeholders.

- **Strategic Plan:** An NSF Engine's strategic plan must articulate a regionally focused vision, shared by a cross-sector of regional partners and community stakeholders. The proposed plan should connect and leverage the key drivers of change in a coordinated and intentional way to elevate and transform an entire region of service into a leading innovation ecosystem in key technology areas while simultaneously addressing the chosen regional, national, societal, and/or geostrategic challenge. A holistic strategic plan should: (1) outline the high-level goals and execution strategies employed for each of the seven drivers of ecosystem change (see Section II.B.3); (2) describe how the seven key drivers will be effectively integrated to achieve the NSF Engine's vision and yield continual high-impact innovations and outcomes; and (3) summarize strategies for the intentional and early engagement of a broad range of regional stakeholders and partners and the team's ongoing communication efforts. The plan should integrate members with different areas of expertise and perspectives, i.e. vocabularies, core values, ways of identifying and developing approaches to problems, and working styles.

The proposal must also address these elements of the NSF Engine's **support infrastructure**:

- **Leadership Team:** Effective leadership is paramount to the success of the NSF Engine and its ability to carry out its mission. As such, the leadership team must have a clear and inclusive vision, strong regional knowledge, and demonstrable leadership experience in the key drivers and technology focus areas of the NSF Engine. The

leadership team should collectively demonstrate successful entrepreneurial experience, a track record of delivering results in the region and the proven ability to communicate clearly and effectively with diverse audiences such as partners, community stakeholders (including government, industry, entrepreneurs, capital investors, academic institutions, non-profits, community and labor organizations), administrative team members, press and media, and the public. Furthermore, the leadership team must embrace an inclusive culture that seeks to bring a diversity of perspectives into the ecosystem and intentionally works to reach into under-served communities and engage untapped talent. The leadership team should be drawn both from within, and outside of, the lead organization and contribute perspectives from a broad range of stakeholders and community groups. The leadership team is responsible for developing and implementing the necessary policies, practices, and formal agreements (e.g., partnership, data agreements) to facilitate key partnerships and to create an environment that drives innovation.

- **Lead Organization:** The lead organization is the NSF award recipient that is ultimately responsible for oversight of all operational and management aspects of the NSF Engine, including all financial and reporting obligations of the award. Proposing teams should ensure that the selected lead has the capacity to meet the broad demands of a lead organization. Moreover, the lead organization should be viewed as a "trusted, honest broker" with the ability to bring together and inspire regional stakeholders to achieve the NSF Engine's goals. The lead organization, where the NSF Engine will be headquartered, must have a significant presence and vested interest in the region of service at the time of the preliminary proposal submission. The proposing PI and the organization employing the proposing PI must already be based in the region of service and have a track record of driving impact and collaboration within the region of service. It is important to note that NSF will conduct a detailed analysis of newly formed organizations and prospective new recipients to verify that a prospective recipient is financially stable, has sufficient resources to complete its proposed efforts, and has sufficient funds to pay operating expenses. Organizations from mature ecosystems that create a new entity in a less mature region with the explicit purpose of applying as a lead organization for the NSF Engines program should be aware that this will be considered contrary to the stated goals and mission of the program.

- **Chief Executive Officer (CEO):** Each NSF Engine must be led by a full-time chief executive officer (CEO), who is responsible for managing the Engine and is responsible for its overall success. The NSF Engine CEO, whose time is 100% allocated to leading the NSF Engine, must be employed by the lead organization. The CEO will also be the PI on the NSF Engine award.

- **Core Management Team:** In addition to the CEO and the Leadership Team, each NSF Engine must have a core management team responsible for all management functions necessary to achieve the NSF Engine's objectives. The specific organization of the core management team depends upon the needs of an NSF Engine but should identify responsibility for core Engine functions (e.g., administration, use-inspired R&D, translation and commercialization, workforce development, stakeholder engagement, outreach, communications, and evaluation and assessment). The core management team should include meaningful representation from the NSF Engine's core partners and key stakeholders and reflect the region's diversity. The core management may also include governance and external advisory boards.

- **Core Partners:** The core partner organizations must work with the lead organization to support the NSF Engine's vision and to provide resources to support its activities. The NSF Engine must have a formal partnership agreement that includes the handling of intellectual property (IP), security (including cybersecurity and research security), and mechanisms for adding or removing partners.

II. B. 3. Key Drivers of Ecosystem Change for NSF Engines

The NSF Engines program is grounded in seven *key drivers of ecosystem change*. To accelerate the region's progress toward a mature regional economy, NSF Engines are expected to develop an interconnected set of initiatives, efforts, and action plans, spanning the seven key drivers. The work should be guided by a strategic plan that connects and leverages the key drivers in a coordinated and intentional way to elevate and transform an NSF Engine's entire region of service into a leading innovation ecosystem in a key technology area based on an identified regional, national, societal, and/or geostrategic challenge. Where applicable, proposals are expected to incorporate ethical, social, economic, health, legal,

safety, and environmental considerations that are relevant to proposed activities of the proposed NSF Engine. See Sections II.B.2 and V for additional information on strategic plans and proposal preparation instructions.

1. **Cross-sector Partnerships and Stakeholder Alignment.** An effective NSF Engine will recruit and sustain an interdependent innovation ecosystem that draws in expertise, involvement, and synergy across a wide range of partners, stakeholder groups, and communities. Partners and stakeholders may include institutions of higher education (IHEs), for-profit industry including small businesses, capital investors, entrepreneurs, local and state governments, Tribal nations, national laboratories, labor and workforce development organizations, non-profits, and community-based organizations. Teams are encouraged to include partners that use the arts, culture, design, or humanities to engage diverse communities around envisioning what it means to be an inclusive innovation ecosystem and in developing creative solutions to the wide range of technology and research challenges NSF Engines will face. The NSF Engine should build on the strengths and capabilities of its partnership network and work to align the interests of the NSF Engine with its regional stakeholders and communities by inviting them to participate in setting goals for use-inspired R&D, translation, and workforce development. The expectation is that the core partnerships and alignment with regional interests and community needs will be deep and meaningful in ways that can be demonstrated, when requested, during the merit review process.

2. **Use-inspired Research and Development (R&D).** A driving force behind a successful NSF Engine will be its use-inspired R&D, which refers to research, technology innovations, and knowledge creation driven by the desire for practical solutions to societal challenges that may have significant potential to support downstream technological developments, new innovations, and economic and societal impacts for the region of service. NSF Engine-supported R&D activities must be inspired by the current regional demands (i.e., market or societal "pull") and future forecasts of needs in industry and/or for end users. Initial R&D can span Technology Readiness Levels (TRLs) 1-5, with the aim of advancing further on the TRL scale with the support of an NSF Engines award. The end goal of R&D and translation activities is to bring products, technologies, or services to market, whether through commercialization or open-source mechanisms. Given the program goals, use-inspired R&D activities that have already advanced beyond basic or applied research should be preferred in the initial two-year period of a proposed NSF Engine. However, proposing teams have the necessary flexibility to propose ambitious projects, independent of the technology readiness level, that have the potential to transform their technology area and region of service within a 10-year timeline. Ultimately, for long-term sustainability and continued innovation outcomes, the NSF Engine will need to foster a continuous flow of innovative ideas, use-inspired R&D, and inventions that span the TRL spectrum and can be sustained beyond the 10-year award period. Proposing teams are encouraged to anticipate the technology needs within the region beyond current capacities and envision new disruptive technologies, i.e., transformative, future-oriented technologies and not just the integration of existing technologies into new industries or regions.

3. **Translation of Innovation to Practice.** A successful NSF Engine will result in tangible translational outcomes such as new products as well as new and expanded businesses and services within the period of the award. Outcomes may also inform the development of new policies and regulations put forward by regional or national entities. Each NSF Engine must establish the expertise, structure, and processes required to support continuous and timely identification and implementation of translation opportunities. This should include analyses of economic and environmental factors that could affect costs and competitiveness. Successful translation requires ongoing engagement and alignment among stakeholders and with communities in the region of service. Further, it is expected that NSF Engines will create multiple entrepreneurial pathways and these pathways will not be limited to the work of a single incubator/accelerator or ventures emerging from a single organization.

4. **Workforce Development.** A robust innovation ecosystem requires a diverse, skilled, and adaptable workforce driven by its labor market needs. NSF Engines should therefore support the creation and implementation of recruitment, education, training, retention, and professional development programs at all levels relevant to the proposed R&D topic area. Plans should emphasize overcoming the specific barriers to inclusive workforce development that are present currently in the region of service. Opportunities for professional development should be made available to all participants, including leadership, students, faculty researchers, entrepreneurs, community members, and industry and government personnel. Good jobs, which pay family-sustaining wages and benefits, can serve as a foundational component of an equitable economy and spur regional economic

growth and shared prosperity. Workforce development plans should describe how efforts of the proposed NSF Engine will lead to the creation and retention of quality jobs accessible to workers from all communities, as defined by the Good Jobs principles published jointly by the Department of Commerce (DOC) and Department of Labor (DOL). Plans should include evidence of the commitment by the NSF Engine and its partners, e.g., industry-aware and industry-funded training and certification programs in the topic area, specific partner commitments to fund internships, co-ops, and summer youth employment, a plan to fund supportive services for workers facing barriers to employment, employer commitments to hire a percentage of participants who complete NSF Engine-supported workforce development programs, and registered apprenticeship and pre-apprenticeship programs. Programs funded by the NSF Engine must develop a proactive strategy to prevent workplace discrimination and harassment, including gender-based violence and harassment, prohibited by applicable federal, local, state, and Tribal labor laws.

The following sources may be helpful to proposing teams as they define a workforce development framework: GoodJobs.gov, DOL's Infrastructure Workforce Framework and guidance on Increasing Access to Good Jobs, Apprenticeship readiness programs (or "pre-apprenticeships"), Registered Apprenticeship Programs (registered via the DOL Office of Apprenticeship or State Apprenticeship Agency) and sector strategies ⤴, and labor-management training partnerships. DOL has developed a resource that can assist their applicants in identifying high-road training programs. This solicitation highlights these resources as examples that may be useful as proposing teams develop strategics plans. All proposed plans should be written based on project goals, available partnerships, and specific regional needs for inclusive workforce development.

5. **Inclusive Engagement.** A key goal of the NSF Engines program is for each NSF Engine to catalyze the creation of an innovation ecosystem that delivers economic growth for everyone in the region of service, regardless of background, socioeconomic status, location, or any other factors. NSF Engine leadership and stakeholders should be broadly representative of the region of service, including within the structures of leadership, management, R&D, translation, and workforce development. A diverse range of stakeholders and communities should be considered in the development of the NSF Engine's goals and should benefit from the outcomes at each project stage. Teams are expected to periodically assess how its efforts are improving diversity and enabling equitable prosperity (with respect to race, ethnicity, gender, persons with disabilities, socioeconomic status, and community type). As part of this focus, each NSF Engine must develop a strategy to ensure that R&D, translation, educational, and workforce opportunities supported by this award are equitably available and have a proactive plan to remove barriers for under-served populations to fully participating in its programs.

The above engagement must go beyond perfunctory outreach initiatives that merely serve as an introduction to NSF Engine activities and instead show a deep, intentional, and persistent approach to building inclusive teams and broadening access. The new participants should not only be representative of individual identities, but also show an expansion of the interdependent regional network into new communities and geographies.

6. **Strategic Regional Investment and Demonstrable Sources of Sustainable Capital.** A successful NSF Engine requires meaningful new investment in the region from regional and national stakeholders AND investment directed specifically for the NSF Engine's proposed topic area and activities. At each review stage (beginning with the preliminary proposal), NSF will require documented evidence of and growth of an NSF Engine's (and its region's) capital stack. New and significant regional co-commitments from a diverse set of stakeholders should be in place at the time of full proposal submission. Regional investments should include, but not be limited to, operating and project-specific funds from state and local governments, Tribal nations, industry, philanthropy, anchor institutions, including universities, and other key stakeholders in the region and nationally. Teams should develop plans for securing specific, actionable, and time-bound commitments from a diversity of capital co-investors, including federal, state, local, and Tribal, philanthropic, corporate, institutions of higher education, and capital markets (e.g., venture capital, private equity). Finally, proposing teams should include specific plans for how the proposed NSF Engine will develop models that harness licensing cash flows, equity stakes, co-ownership of assets, and other shared revenue models that complement the proposed strategy. As a starting point on how to think about building a sustainable capital stack and sustainability strategy, proposing teams may find the following article useful in developing its sustainability framework: *Beyond federal grants: Sustaining place-based economic development* ⤴.

7. **Governance and Management.** Participation by a cross-section of stakeholders is critical to effective ecosystem building. The NSF Engine must work to bring the partners together and create alignment in setting goals to maximize the impact and benefits for all regional stakeholders. The leadership team is responsible for developing and implementing the necessary policies, practices, and formal agreements (e.g., partnership, data, and IP agreements) to facilitate key partnerships and, ultimately, to create an environment that drives innovation. An effective leadership team will need the expertise and local community standing to provide vision, management, and oversight of the NSF Engine's operations and all key elements of building an inclusive innovation ecosystem (see key foundational elements in Section II.B.2). Members of the leadership team are expected to participate in NSF-organized convenings for training and cross-team collaboration. This training will be a significant time investment. Details will be provided to teams selected to receive awards after the completion of the merit review process.

Teams do not need to place the same level of emphasis on each driver. For example, via a gap analysis led by the lead organization with its regional partners and community stakeholders, a region may determine that it has sufficiently strong use-inspired R&D assets but lacks the necessary levels of capital investments or partnerships with community organizations in its region of service. In the proposal, teams should highlight their current competitive advantages and strengths among the key drivers and explain how they plan to fully develop all drivers with particular attention to those areas that could benefit most from the NSF Engines award.

Proposing teams should carefully consider the promises and challenges facing regional innovation ecosystems as they assess their capabilities and needs vis-à-vis these drivers. The key dependencies for place-based innovation policy interventions described in the following article might prove valuable for this purpose: Accelerating Innovation Ecosystems: The Promise And Challenges Of Regional Innovation Engines ⤢.

II. C. Evaluation Plan

Each NSF Engine must develop a comprehensive Evaluation Plan containing baselines; benchmarks; Specific, Measurable, Achievable, Relevant, and Timely (SMART) goals; and targets specific to its region of service as well as topic area, including key technology focus area(s). The plan should include methods to assess the progress made toward achieving the goals and milestones of the programmatic activities taking place within an NSF Engine as well as the overall goals of the NSF Engine. Through the evaluation process, successful teams will at a minimum demonstrate:

- The "added value" of being funded as an NSF Engine (rather than a set of individually funded projects);
- Benefits to the region of service through creation and retention of high-quality jobs with family-sustaining pay and good benefits and other inclusive economic opportunities;
- Effectiveness of partnerships with diverse stakeholders;
- Achievement of strategic goals shared by the lead and partnering organizations;
- Integration of a meaningful culture of inclusion across all aspects of the NSF Engine, including the leadership team, key drivers of ecosystem change, and operations;
- Effective implementation of educational and workforce training opportunities, such as registered apprenticeships, pre-apprenticeships, summer youth employment, labor-management training partnerships, career and technical education, internships, co-ops, vocational training, joint appointments, and other quality work-based learning and experiential learning opportunities;
- Successful attraction, leveraging, and effective utilization of complementary funding from other sources beyond NSF; and
- Links and synergistic collaborations with existing innovation ecosystems and other hubs and assets within the region, including federally funded R&D centers and National Labs.

NSF Engines are expected to continuously monitor and assess their performance against established goals, milestones, and associated targets. Such assessments are expected to involve active participation and input from all stakeholders engaged in or impacted by the Engine's activities. In addition to programmatic parameters, NSF will also consider an NSF Engine's own parameters for measuring performance in determining eligibility for continued funding.

The proposal must describe the process by which the Evaluation Plan will be used by the NSF Engine team throughout the 10-year duration of the program. Evaluation should focus on outcomes that demonstrate achievement of its goals and should further provide indicators that capture the quality, depth, and impact of the NSF Engines activities, rather than simply raw numbers.

NSF Engines should use the evaluation plans and associated quarterly and annual project reports not only as a reporting mechanism for NSF to track progress versus specific metrics, but also as a tool for stakeholders in the NSF Engine to see progress toward outcomes of value to them. See Sections III and VII for additional information on how the Evaluation Plan will be used during the post-award assessment process.

III. Award Information

NSF intends to fund all high-quality NSF Engines proposals to expand the geography of American innovation. The overall number of awards will be determined by the number of high-quality proposals received and the availability of funds appropriated by Congress. NSF Engines can be funded for up to ten years, with an initial award for the first two years and subsequent awards for years 3-5 and 6-10, based on performance reviews and evaluations.

Awards can receive funding for up to 10 years. The initial two years of funding will support a ramp-up period. Continued support for the NSF Engine will be contingent upon the NSF Engine's overall performance, including meeting its annual performance goals.

The NSF Engine can be funded for up to a total of $15,000,000 in Years 1-2.

The NSF Engine can be funded at up to $15,000,000 per year in Years 3-5.

The NSF Engine can be funded at up to $20,000,000 per year in Years 6-10.

The total amount of an award will not exceed $160,000,000 from NSF (over a period not exceeding ten years).

The NSF Engines program retains the right to fund submitted proposals as NSF Engines Development Awards – awards designed to enable recipients additional time and funding to lay the additional groundwork needed to launch a full-scale NSF Engine – based on the outcomes of the merit review process. In exercising this right, NSF reserves the option to fund only a subset of activities described in the proposal, including funding only the partnership development and/or network formation aspects of the project.

Continued Funding Decisions for NSF Engine Awards: Beyond Year 1 of an award, the NSF Engine is responsible for providing an annual comprehensive assessment of the Engine's performance, which will inform subsequent-year funding. In addition, NSF will conduct additional reviews involving NSF Program Directors and/or a Site Visit Team to assess the NSF Engine's accomplishments and future tasks, with an emphasis on tangible outcomes, overall societal and economic impacts, and progress toward achieving long-term goals and milestones.

Continued funding will be based on a combination of the annual reporting by the award recipients and regularly scheduled evaluation and review cycles (at the times to be outlined in the cooperative agreement) and may also include input from an external evaluator. The cognizant program officer, working with the NSF Engines post-award management team, will sign off on the obligation of funds on an annual basis. Continued funding is not guaranteed and requires the award recipient to meet all performance requirements described and agreed to in the cooperative agreement. If NSF determines during any review that the NSF Engine has failed to perform, additional funding may be withheld. NSF Engine recipients should be aware that continued funding also depends on the availability of funds to the NSF Engines Program.

If an NSF Engine is not meeting performance requirements, NSF will work with the recipient to mitigate the issues. During this mitigation period, NSF may engage in more frequent assessments, including site visits, as necessary. If the NSF Engine is unable to resolve performance issues within a specified time period, NSF funding will be discontinued. The NSF Engines program team may continue to work with the Engine to meet its overall goals for the proposed region of service. The details of a mitigation period and/or ramp-down will be subject to negotiation between NSF and the recipient under the terms of the cooperative agreement.

NSF Post-Award Oversight Including Site Visits of Engines: NSF will negotiate the final Evaluation Plan for the initial award with the recipient in the fourth quarter of year 1, based on the expected NSF Engine maturity characteristics and outcomes. As defined in the cooperative agreement, NSF will assess post-award outcomes against this plan at assessment checkpoints. Resource contributions made by participating organizations and partners of an NSF Engine and the effective utilization of such resources in advancing the mission will be an important factor in the post-award management and assessment process.

IV. Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research laboratories, professional societies and similar organizations located in the U.S. that are directly associated with educational or research activities.
- For-profit organizations: U.S.-based commercial organizations, including small businesses, with strong capabilities in scientific or engineering research or education and a passion for innovation.
- Tribal Nations: An American Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges as a federally recognized tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. §§ 5130-5131.
- State and Local Governments

Who May Serve as PI:

The Principal Investigator (PI) must be a senior member of the submitting organization's leadership and will also serve as the full-time CEO for the NSF Engine. At the time of proposal submission, this role may be filled by an interim CEO until a full-time CEO is named or recruited. The designation of a full-time CEO must occur within the first six months of the start date of the award.

Individuals who are a party to a Malign Foreign Talent Recruitment Program are not eligible to serve as a senior/key person on an NSF proposal or award.

Limit on Number of Proposals per Organization: 1

An organization may submit no more than one Letter of Intent (LOI), one preliminary proposal, and one full proposal in response to this solicitation as the lead organization. If an organization exceeds this limitation, LOIs, preliminary proposals, and full proposals will be accepted based on earliest date and time of submission (i.e., the first proposal will be accepted, and the remainder will be returned without review). A lead organization on a proposal may be a sub-recipient on a different proposal. There is no limit on the number of proposals for which an organization can serve as a sub-recipient

Additional Guidance for proposers new to NSF: Any proposer who has not submitted a proposal to NSF within the previous five years, must review the guidance for new and returning proposers in the NSF New Proposer Submission - Supplementary Guidance document, which provides a timeline and walk-through of the key milestones that must be completed in order to submit proposals to NSF.

The lead organization must have a Unique Entity Identifier (UEI) and be fully registered at SAM.gov at the time of LOI submission. Personnel designated as a PI or co-PI must have an NSF ID at the time of LOI submission. The Lead organization and all sub-recipients must have an active UEI number and must be registered with NSF to submit a Full NSF Engines Proposal. To register your organization with NSF, visit https://www.research.gov/. To find or request a Unique Entity Identifier (UEI), please visit https://sam.gov/content/home. Any individual designated as Senior/Key Personnel is required to have an NSF ID.

Limit on Number of Proposals per PI or co-PI: 1

An individual may serve as PI or co-PI on no more than one proposal submitted in response to this solicitation.

Individuals who are a party to a Malign Foreign Talent Recruitment Program are not eligible to serve as a senior/key person on an NSF proposal or award.

Additional Eligibility Info:

Proposals must be submitted by a single lead organization with any partner organizations listed as sub-recipients Separately submitted collaborative proposals will not be accepted. (See PAPPG Chapter II.E.3 for further information)

In addition to the organizational types eligible to submit proposals, the following additional organizational types are eligible to receive NSF funds through subawards under this solicitation:

- Federally Funded Research and Development Centers; and
- National Laboratories.

International partners are not permitted to be included as part of a proposal submitted to NSF pursuant to this solicitation. After an award has been made, however, an international partner/collaborator may be added in accordance with the procedures established in Section VII. No international partners may receive funding from the NSF award.

NOTE: All submitting organizations should review the responsibilities of the Lead Organizations, outlined in Section II.B.2. Lead organizations are encouraged to carefully consider whether their mission aligns with the mission, goals, and operational requirements of an NSF Engine. Regional teams should select a lead that has the necessary operational capacity and regional trust needed to lead an NSF Engine and catalyze a vibrant and inclusive regional innovation ecosystem.

Who Cannot Serve as an NSF Engine Partner

The following are not eligible to serve as partners or otherwise participate under this solicitation:

- Organizations on the Department of Commerce's Bureau of Industry and Security (BIS) Entity List;
- Any entity identified under section 1260h of the William M. (Mac) Thornberry National Defense Authorization Act (NDAA) for FY 2021 (10 U.S.C. 113 note; Public Law 116-283). The most recent list of entities may be found at: https://www.federalregister.gov/documents/2021/06/28/2021-13753/notice-of-designation-of-chinese-military-companies-under-the-william-m-mac-thornberry-ndaa-for-fy21;
- Any "foreign entities of concern" as defined in section 10638(3) of the Chips and Science Act of 2022 (Public Law 117-167, Division B), which includes, among others, entities owned by, controlled by, or subject to the jurisdiction or direction of the government of the Democratic People's Republic of North Korea, the People's Republic of China, the Russian Federation, or the Islamic Republic of Iran; and
- Unaffiliated individuals.

An organization that is not eligible to be an Engine partner or to receive NSF funds is not eligible to submit a proposal in response to this solicitation or to otherwise participate in this program.

Who May Serve as CEO

The CEO must be employed by and based at the lead organization. At the time of proposal submission, this role may be filled by an interim CEO until a full-time CEO is named or recruited. Designation of a full-time CEO, whose time is 100% allocated to leading the Engine, must occur within the first six months of the start date of the award.

Individuals who are a party to a Malign Foreign Talent Recruitment Program are not eligible to serve as a senior/key person on an NSF proposal or award.

V. Proposal Preparation And Submission Instructions

A. Proposal Preparation Instructions

Letters of Intent *(required)*:

A Letter of Intent (LOI) is required to be eligible to submit a preliminary proposal. The LOI must be submitted via Research.gov no later than the LOI deadline date.

Please note the following conditions:

- LOIs must be submitted through Research.gov, which requires that each LOI has an LOI Title, a Project Synopsis, and an associated PI/CEO.
- A Minimum of one PI/CEO and up to four co-PIs are allowed.
- An organization may submit no more than one LOI in response to this solicitation as a lead organization.

Title: The title should begin with "NSF Engine:".

NSF Engine CEO and Point of Contact for NSF Inquiries: Please include the PI/CEO's name, Organization, phone number, and e-mail address.

Anticipated Engine co-PIs: Include up to four co-PIs. Include their name, organization, and location (city, state). The co-PIs may come from the Lead organization and any of the core partner organizations participating in proposal development. The PI/CEO does not count towards the minimum/maximum requirement.

Anticipated Core Partner Organizations: The *Manage Participating Organizations* (in Research.gov) section can include a minimum of one and a maximum of four participating organizations. Up to four committed core partner organizations should be listed here.

Synopsis (not to exceed one page, in a single PDF file not to exceed 10 MB in size): The synopsis must include brief descriptions of the following elements: (1) the proposed vision; (2) the region of service including the region's competitive advantage, as it relates to the proposed topic area(s); (3) regional, national, societal, and/or geostrategic challenges(s), including key technology areas that will be advanced; (4) goals of the proposed Engine; and (5) the potential for high-impact outcomes.

After the summary statements, the one-page synopsis **must** also include the following required information in this order and using these headings:

- **Region of Service:** Include the state (two-letter abbreviations only) that encompasses the intended region of service. If the proposed region of service includes multiple states, list the state names (using the two-letter abbreviations only), list the state of the Lead org first, followed by other states in alphabetical order. After listing the states, please also include all relevant Core-based statistical areas (CBSAs). CBSAs include both Metropolitan and Micropolitan Statistical Areas. A list of CBSAs can be found here. Use the CBSA name and exact spelling found

in column D of the downloadable excel spreadsheet. If your region of service does not include one or more CBSA, list the CBSA heading only.

> **Example:**
> **Region of Service**
> **State(s):** ND
> **CBSA(s):** Fargo, ND; Wahpeton, ND, Bismarck, ND; Minot, ND; Grand Forks, ND; Williston, ND; Dickinson, ND; Jamestown, ND.

- **Overarching Challenge:** Challenge 1, Challenge 2, Challenge 3: In decreasing emphasis, list up to three key words or phrases that identify the overarching societal, regional, national, and/or geostrategic challenges (s) that will be addressed by this proposal.

  > **Example:**
  > **Overarching Challenge(s):** Resilient Food Systems

- **Keywords:** Keyword-1, Keyword-2, Keyword-3, Keyword-4, Keyword-5: In order of decreasing emphasis, list up to five keywords that represent the key technology focus area(s) to be addressed by this proposal. Find examples of key technology areas here.

  > **Example:**
  > **Keywords:** Biotechnology, advanced computing and semiconductors, advanced materials, advanced communications, artificial intelligence.

- **Industry Sectors:** Industry 1, Industry 2, Industry 3: In order of decreasing emphasis, list up to three industry sectors that will be impacted by the advancements and technology outcomes resulting from the proposed Engine's efforts. Use the four-digit North American Industry Classification System (NAICS) code for each sector from the 2022 NAICS Manual.

  > **Example:**
  > **Industry Sectors:** 1111 (Oilseed and Grain Farming), 5417 (Scientific Research and Development Services)

- **NSF Engine Development Award(s):** If the lead organization and/or a core partner organization received an NSF Engine Development Award(s), include this information as the final lines of the synopsis:
  - **NSF Engine Development Award Title(s):** Include the full title of the development award, separated by a semi-colon if the proposing team included more than one development award (e.g., two or more development award recipient teams have merged).
  - **NSF Engine Development Award ID (s):** Include only the 7-digit award ID, separated by a semi-colon if there is more than one.
  - **Name of PI for the Development Award (s):** PI Last Name, PI First Name
  - **Lead Organization for the Development Award (s):** Organization Name

Other Comments (The "Other comments" feature is a textbox in the LOI module that can accommodate an additional max 2,500 characters including any blank spaces): The Other Comments section **must** include the required disclosure statement described below.

Mandatory Disclosure: NSF reserves the right to publish or otherwise make available a summary of a subset of, or all, the submitted LOIs, the associated preliminary and/or full proposal information at any time between the time of submission of the LOI and the time of announcement of NSF Engines awards. Such summaries may include the following information about each proposal: (1) submission title, (2) lead organization name and organization type, (3) geographical information provided by proposers about the region of service, (4) name and contact information of the CEO (or current PI, if a CEO has not yet been determined), (5) topic area, (6) key technology areas, and (7) a brief description of the proposal, not to exceed 5 sentences. NSF also reserves the right to announce these summaries for a subset of proposals

that are under consideration during the different stages of the merit review process, including, but not limited to, the pre-proposal stage and the site visit stage.

For Privacy Act Purposes, proposers are **required** to include the following statement at the end of the "Other Comments" textbox. "I, [insert PI's name], hereby consent to the disclosure of a summary of my NSF Engines proposal as described in the NSF Engines solicitation."

Letter of Intent Preparation Instructions:

When submitting a Letter of Intent through Research.gov in response to this Program Solicitation please note the conditions outlined below:

- Submission by an Authorized Organizational Representative (AOR) is required when submitting Letters of Intent.
- A Minimum of 0 and Maximum of 4 Other Senior Project Personnel are permitted
- A Minimum of 0 and Maximum of 4 Other Participating Organizations are permitted
- Submission of multiple Letters of Intent is not permitted

Preliminary Proposals *(required)*: Preliminary proposals are required and must be submitted via Research.gov, even if full proposals will be submitted via Grants.gov.

Preliminary proposals are required and must be submitted via Research.gov, no later than the preliminary proposal deadline date.

Preliminary proposals will be evaluated using NSF merit review processes and submitting teams will either be *invited* or *not invited* to submit full proposals based upon this review.

The purpose of the preliminary proposal is to provide a compelling overview of and vision for the proposed NSF Engine and region of service. The preliminary proposal must demonstrate alignment with the mission and goals of the NSF Engines program and an appropriate scope and scale to justify the need for a 10-year NSF Engine investment. A proposed region of service must have the regional support necessary to build a self-sustaining inclusive regional innovation ecosystem. Furthermore, the key technology R&D focus area(s) should have the potential for significant regional, national, societal, and/or geostrategic impacts. The preliminary proposal should also describe the leadership team and include a discussion of why this team and the core partners are qualified to lead the Engine and regional efforts.

The required sections of a preliminary proposal are as follows. Submissions that are incomplete, materially lacking, or not responsive to the technical or administrative requirements of this solicitation may not be reviewed or may be evaluated as-is without further opportunity for revision at the discretion of NSF's review process.

1. Cover Sheet
2. Project Summary
3. Project Description (up to 10 pages)
   NOTE: The Project Description also must contain, as a separate section within the narrative, a section labeled "Broader Impacts", and "Broader Impacts" must appear as a heading on its own line, with no other text on the line, including heading number. See the Project Description outline below for instructions on where to include the "Broader Impacts" section.
4. References Cited
5. Senior/Key Personnel Documents
   a. Biographical Sketches
   b. Current and Pending (Other) Support
   c. Collaborators and Other Affiliations Information
6. Supplementary Documents
   a. Consolidated Personnel List Spreadsheet

b. Region of Service Map

c. Existing and New Resources

d. NSF Engines Development Award Recipient Information

e. Letters of Commitment and Collaboration

7. Additional Single Copy Documents

a. Mandatory Disclosure

Preliminary Proposal Set-Up: Select "Prepare New Preliminary Proposal" in Research.gov. Search for and select this solicitation title in Step One of the Preliminary Proposal wizard. In Step Three, select "Single proposal (with or without subawards)." Separately submitted collaborative proposals are not permitted. The title should begin with "NSF Engine:". The title can change from the LOI to the submitted preliminary proposal. The title should reflect the topic area focus and region of service.

1. **Cover Sheet:** Select the proposed start date and enter a proposed duration of 120 months.

2. **Project Summary (1 page):** Each preliminary proposal must contain a summary of the proposed project not more than one page in length. *The Project Summary must include three separate sections labeled with the following headers: "Overview," "Intellectual Merit," and "Broader Impacts." To be valid, a heading must be on its own line with no other text on that line.* The Project Summary should be written in third person and informative to other people working in the same or related fields. It should not be an abstract of the proposal. **Do not include proprietary information in the Project Summary.** Additional instructions for preparation of the Project Summary are available in Research.gov.

   Proposals lacking a complete Project Summary will be Returned Without Review. A complete Project Summary includes information in all three sections:

   Overview
   The Overview section should include a concise statement of purpose with respect to the overarching regional, national, societal, and/or geostrategic challenge(s), key technology R&D focus area(s), and anticipated regional importance and economic impact. The Overview should describe the potential key outcomes of the proposed Engine, e.g., in terms of use-inspired R&D, translation of innovation outcomes (e.g., products, startups, processes, or services), and inclusive regional workforce and economic development. The Overview section should also outline the key industries and technology areas that will be advanced and impact national competitiveness.

   Intellectual Merit
   This section must begin with "This proposed NSF Engine..." The section must address the intellectual merits of the proposed NSF Engine. Briefly describe the goals, broad challenges, and scientific and engineering hurdle(s) that will be addressed by the proposed use-inspired R&D, technology development and commercialization, and a high-level summary of the strategic plan to build a sustainable innovation ecosystem to reach those goals.

   Broader Impacts
   This section must discuss the expected measurable outcomes in terms of how the proposed Engine will build and catalyze an inclusive innovation ecosystem within the region of service and the anticipated regional impact and benefits to stakeholders and communities.

   After the required sections above, the one-page project summary must also include the following required information in this order and using these headings. While it is expected that the general theme of the proposed Engine is expected to remain as defined in the LOI, these descriptors can be revised/updated (from what was submitted with the LOI).

   - **Overarching Challenge:** Challenge 1, Challenge 2, Challenge 3: In decreasing emphasis, list up to three key words or phrases that identify the overarching societal, regional, national, and/or geostrategic challenges (s) that will be addressed by this proposal.

Example:
Overarching Challenge(s): Resilient Food Systems

- **Keywords:** Keyword-1, Keyword-2, Keyword-3, Keyword-4, Keyword-5: In order of decreasing emphasis, list up to five keywords that represent the key technology focus area(s) to be addressed by this proposal. Find examples of key technology areas here.

  Example:
  Keywords: Biotechnology, advanced computing and semiconductors, advanced materials, advanced communications, artificial intelligence.

- **Industry Sectors:** Industry 1, Industry 2, Industry 3: In order of decreasing emphasis, list up to three industry sectors that will be impacted by the advancements and technology outcomes resulting from the proposed Engine's efforts. Use the four-digit North American Industry Classification System (NAICS) code for each sector from the 2022 NAICS Manual.

  Example:
  Industry Sectors: 1111 (Oilseed and Grain Farming), 5417 (Scientific Research and Development Services)

3. **Project Description:** The project description should not exceed 10 pages. All figures and tables must be included within the 10-page limit. Preliminary proposal evaluation will consider the assets currently in the region of service that will contribute to building the interdependent ecosystem and the potential of the transformative, future-oriented R&D topic, and translation efforts to serve as the basis for a national leading innovation ecosystem.

   The Intellectual Merit and Broader Impacts of the proposed Engine must be addressed and described throughout the narrative as an integral part of the Project Description. A separate section for Broader Impacts is required in the project description for the preliminary proposal at the end of the "Vision and Scope" section. *Results from Prior Support is not a required section for the preliminary proposal.*

   Outline for the Preliminary Proposal Project Description (up to 10 pages)

   The project description must contain the following sections with these headings:

   I. **Vision and Scope:** This section should introduce the shared vision for the proposed NSF Engine and regional innovation ecosystem, including the overarching regional, national, societal, and/or geostrategic challenge(s), the key technology area(s) that will be advanced, potential industries that will be impacted, innovation ecosystem goals, and the potential high-impact outcomes. This section should list the core partner organizations of the proposing team and describe each organization's primary contributions to achieving the Engine's goals.

   Broader Impacts
   IMPORTANT NOTE: The Project Description also must contain, as a separate section within the narrative, a section labeled "Broader Impacts", and "Broader Impacts" must appear as a heading on its own line, with no other text on the line, including heading number. This section should provide a discussion of the broader impacts of the proposed activities. Proposals should include the required Broader Impacts section at the end of the "Vision and Scope" section of the project description for the preliminary proposal.

   II. **Technology Innovation Plans:** This section should detail how the proposed NSF Engine addresses current technical and scientific use-inspired R&D and translation challenges, pursues technology development and future-oriented innovations, and leverages economic and use-inspired opportunities. This section should describe an integrated approach to creating a continuing flow of innovations along TRL maturity levels that will have significant economic and societal impacts. This section should also include evidence that this proposal comes at the right time and is in the right place, based on assets already present in the region, to make it likely that this NSF Engine and its region of service will become a national leader in the proposed R&D topic area.

III. **Region of Service:** This section should describe the proposed geographical region of service to be impacted by the NSF Engine's efforts, should clearly articulate the region's competitive advantage within the proposed topic areas, and should demonstrate that the geographical size of the proposed region of service is consistent with the goal of achieving measurable economic change. Provide a brief statement on why you believe the NSF Engine's efforts will be successful in accelerating the entire region's innovation ecosystem and building inclusive community wealth.

IV. **Strategy to Address Ecosystem Gaps:** This section should identify the gaps in the current innovation ecosystem in the region of service *with respect to the seven key drivers of ecosystem change* described earlier in this solicitation. Summarize an integrated strategic plan that addresses the identified gaps and describes the team's vision to create a sustainable innovation ecosystem that is a national leader in the NSF Engine's proposed R&D topic area.

V. **Key Partners and Stakeholders in the Region of Service:** This section should identify key partners and stakeholder groups already committed to working with the Engine and describe plans to grow and strengthen an inclusive and interdependent innovation ecosystem that builds on the strengths and capabilities of the partnership network and a cross-section of regional stakeholders and communities. The plans should discuss specific strategies for inclusive engagement across the region of service, including benefits to under-served communities and untapped populations traditionally underrepresented in STEM.

4. **References Cited:** List only references cited in the Project Description. See PAPPG Chapter II.D.2.e for detailed instructions.

5. **Senior/Key Personnel Documents:**

   a. **Biographical Sketches:** A biographical sketch must be provided separately for each individual designated as a senior/key person through use of SciENcv (Science Experts Network Curriculum Vitae). SciENcv will produce an NSF-compliant PDF version of the biographical sketch. Senior/key personnel must prepare, save, certify, and submit these documents as part of their preliminary proposal. See PAPPG instructions in Chapter II.D.2.h(i) for more detailed information, including instructions requiring individuals are required to disclose contracts associated with participation in programs sponsored by foreign governments, instrumentalities, or entities, including foreign government-sponsored talent recruitment programs.

   b. **Current and Pending (Other) Support**: Current and pending (other) support information must be provided separately for each individual designated as a senior/key person through use of SciENcv (Science Experts Network Curriculum Vitae). SciENcv will produce an NSF-compliant PDF version of current and pending (other) support. Senior/key personnel must prepare, save, certify, and submit these documents as part of their preliminary proposal. Proposers must follow the instructions in Chapter II.D.2.h(ii) of the NSF PAPPG.

   c. **Collaborators and Other Affiliations Information (Required):** Collaborators and other affiliations (COA) must be separately provided for each individual identified as a senior/key person on the project. The COA information must be provided through use of the COA template. Proposers must follow the guidance specified in Chapter II.D.2.h(iii) of the NSF PAPPG.

6. **Supplementary Documents**:

   a. **Consolidated Personnel List Spreadsheet** (Click here to access the required spreadsheet template): See instructions in Special Information and Supplementary Documentation of the Full Proposal Preparation Instructions below.

   b. **Existing and New Resources to be Made Available for the Project:** See instructions in Special Information and Supplementary Documentation of the Full Proposal Preparation Instructions below.

   c. **Region of Service Map**: See instructions in Special Information and Supplementary Documentation of the Full Proposal Preparation Instructions below.

> **IMPORTANT INSTRUCTIONS:** *These instructions below apply only to the above three supplementary documents.*

Prior to submission of the preliminary proposal:

1. Convert each of the three files into a separate PDF document using these file names:
    a. "Consolidated Personnel List"
    b. "Existing and New Resources Spreadsheet Template"
    c. "Region of Service Map"
2. Once completed, the files should be uploaded as three separate supplementary documents and **MUST** be submitted with the preliminary proposal via Research.gov.
3. Important reminders, when uploading PDF documents via Research.gov.
    - The files should not be protected or encrypted;
    - The files should not be an image-only document (i.e., should contain editable text to allow software readability); and
    - None of the files should be a Portfolio PDF.

After submission of the preliminary proposal (once a proposal ID has been assigned):

1. Rename the three Excel spreadsheets using the following naming conventions (these naming conventions MUST be used):
    a. [Proposal ID#]_[PI's last name]_Consolidated Personnel List
    b. [Proposal ID#]_[PI's last name]_Existing and New Resources Spreadsheet Template
    c. [Proposal ID#]_[PI's last name]_Region of Service Map
2. In a single email message, send the three Excel spreadsheets named as indicated above (as attachments) to engines@nsf.gov. That is, send a single email message with three attachments.
3. The subject line for the email MUST be [Proposal ID#]: NSF Engines Proposal

NOTE: *Teams must complete the above instructions within 24 hours of submitting the preliminary proposal. Proposals that fail to submit the above supplementary documents via Research.gov and via email may be returned without review.*

d. **NSF Engine Development Award Information:** If the proposing team and/or a core partner organization received an NSF Engines Development Award(s), the following information must be submitted as a supplementary document. If there was more than one award, please list them consecutively in the document.

- **NSF Engine Development Award Title(s):** Include the full title of the development award, separated by a semi-colon if the proposing team included more than one development award (e.g., two or more development awardee teams have merged).

- **NSF Engine Development Award ID (s):** Include only the 7-digit award ID, separated by a semi-colon if there is more than one.

- **Name of PI for the Development Award (s):** PI Last Name, PI First Name; separated by a semi-colon if there is more than one.

- **Lead Organization for the Development Award (s):** Organization Name; separated by a semi-colon if there is more than one.

e. **Letters of Commitment (1) and Collaboration (4-6)** An NSF Engine must represent a regional initiative that goes well beyond the mission of any single stakeholder (e.g., IHE, major corporation). The preliminary proposal must demonstrate a clear regional focus with significant buy-in and support from key regional

stakeholders. Preliminary proposals must include a letter of commitment from the lead organization and a minimum of four, and no more than six, letters of collaboration from key regional stakeholders as described below. The lead organization's letter is limited to two pages; the other four to six letters are limited to one page in length.

- A letter of commitment from a senior official of the lead organization (e.g., IHE President, CEO for-profit industry) must be submitted which describes the support for and commitment to the proposed NSF Engine should it be funded (including physical space for the Engine headquarters and other resources). The purpose of this letter is to demonstrate the lead organization's full support for the proposed Engine and its commitment to maximizing the proposed Engine's impact in the region. This letter should NOT include any financial commitments. Instead, the senior official should make a statement as to how the proposed NSF Engine and the key drivers of ecosystem change align with the strategic directions of the Lead organization and outline demonstrable ways in which the lead organization will support the NSF Engine's mission of catalyzing an inclusive sustainable innovation ecosystem within the region of service. The letter of commitment may also describe specific resource commitments or examples of how the lead organization will support the development of the full NSF Engine proposal. Proposals submitted without a letter of commitment from the senior official of the lead organization will be returned without review. This letter is limited to two pages.

- In addition to a letter of commitment from the lead organization, letters of collaboration from at least four (but no more than six) major regional stakeholders must be submitted with the preliminary proposal. Proposing teams are encouraged to obtain letters from a range of stakeholder organizations that demonstrate a commitment to actively engage in the NSF Engine's leadership, operations, governance and/or programmatic activities. These letters should be signed by a senior official (or his/her designee) of the stakeholder organization and should outline specific resource commitments (in-kind and/or cash) should the proposal be awarded. The letters should demonstrate support for the proposed NSF Engine in the region of service and describe how the stakeholder organization's strategic directions align with the key drivers of ecosystem change and regional priorities. These four to six letters of collaboration are limited to one page.

Each letter of commitment or collaboration must end with the following text:

By signing below, I acknowledge that I, or my organization, will collaborate and/or commit resources as detailed in the proposal, entitled "_____". I, or my organization, agree to undertake the tasks described, and commit to contribute or make available the resources described in the Project Description or the Existing and New Resources to be Made Available for the Project section of the proposal.

Signed: _____ Print Name: _____

Date: _____ Organization: _____

Letters of support or endorsement for the project are not accepted.

7. **Additional Single Copy Documents:**

   a. **Mandatory Disclosure:** NSF reserves the right to publish or otherwise make available a summary of a subset of, or all, the submitted LOIs, the associated preliminary and/or full proposal information at any time between the time of submission of the LOI and the time of announcement of NSF Engines awards. Such summaries may include the following information about each proposal: (1) submission title, (2) lead organization name and organization type, (3) geographical information provided by proposers about the region of service, (4) name and contact information of the CEO (or current PI, if a CEO has not yet been determined), (5) topic area, (6) key technology areas, and (7) a brief description of the proposal, not to exceed 5 sentences. NSF also reserves the right to announce these summaries for a subset of proposals that are under consideration during the different stages of the merit review process, including, but not limited to, the pre-proposal stage and the site visit stage.

For Privacy Act Purposes, proposers are required to submit a disclosure statement with only the following text: "I, [insert PI's name], hereby consent to the disclosure of a summary of my NSF Engines proposal as described in the NSF Engines Solicitation."

Proposals submitted without this disclosure statement uploaded as a Single-Copy Document will be returned without review.

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Research.gov or Grants.gov.

- Full Proposals submitted via Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal and Award Policies and Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov*. The complete text of the *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

See PAPPG Chapter II.D.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

Due to the complexity of this program, proposers are strongly encouraged to use Research.gov for the preparation and submission of invited full proposals.

Please note that the proposal preparation instructions provided in this NSF Engines Solicitation may deviate from the PAPPG instructions. The solicitation addresses deviations from the PAPPG, addressing program-specific considerations for certain sections. Where not otherwise addressed, proposals must conform fully with the guidance contained in Chapter II.D.2 of the PAPPG.

Important Instructions

a. **Full proposals will be accepted only if they are invited based on a preliminary proposal submitted to this program.** When preparing a full proposal for this competition, proposers are advised to review the Program Description and the Proposal Review Information found in this solicitation for general information pertinent to this program.

b. **As a multi-organization activity, the proposal must be submitted as a single, integrated proposal by a lead organization, with proposed subawards to the other partner organizations. Separately submitted collaborative proposals from multiple organizations will be returned without review.**

c. For proposals submitted via Research.gov, the system will automatically paginate a proposal. Each section of the proposal that is uploaded as a file should leave out page numbering unless otherwise directed within Research.gov.

d. The required sections of a Full Proposal are as follows. Submissions that are incomplete or not responsive to the technical or administrative requirements of this Solicitation may not be reviewed or may be evaluated as-is without further opportunity for revision at the discretion of NSF's review process.

1. Cover Sheet

2. Project Summary

3. Table of Contents

4. Project Description
   NOTE: The Project Description also must contain, as a separate section within the narrative, a section labeled "Broader Impacts", and "Broader Impacts" must appear as a heading on its own line, with no other text on the line, including heading number. See the Project Description outline below for instructions on where to include the "Broader Impact" section within the narrative of your Engine Proposal.

5. References Cited

6. Budget and Budget Justification

7. Facilities, Equipment, and Other Resources

8. Senior/Key Personnel Documents
   a. Biographical Sketches
   b. Current and Pending (Other) Support
   c. Collaborators and Other Affiliations Information
   d. Synergistic Activities

9. Special Information and Supplementary Documentation
   a. Consolidated Personnel List Spreadsheet
   b. Existing and New Resources to be Made Available for the Project
   c. Region of Service Map
   d. NSF Engines Development Awardee Information
   e. Seeking and Obtaining Tribal Nation Approval for Proposals that May Impact Tribal Resources or Interests
   f. Letters of Commitment and Collaboration
   g. Data Management and Sharing Plan
   h. Invitation to submit full proposal
   i. Mentoring Plan (if applicable)
   j. Shared Infrastructure (if applicable)

10. Additional Single Copy Documents
    a. Mandatory Disclosure
    b. Proprietary Data Restrictions (if applicable)

Full Proposal Set-Up: Select "Prepare New Full Proposal" in Research.gov. Search for and select this solicitation title in Step One of the Full Proposal wizard. In the proposal details section, select "Single proposal (with or without subawards)." Separately submitted collaborative proposals will be returned without review.

Project Title: The title should begin with "NSF Engine:".

The required sections of an Engine Full Proposal are as follows:

1. **Cover Sheet:**

a. *Requested Start Date and Proposal Duration*: Enter March 1, 2026 as the start date. The proposed duration should be 120 months.

b. *Related Letter of Intent (LOI):* Enter the LOI ID number that was issued upon submission of the related LOI.

c. *Related Preliminary Proposal:* Provide the Preliminary Proposal Number of the related preliminary proposal. Only organizations that submitted a preliminary proposal and have been invited to submit a full proposal are eligible to submit a full proposal.

2. **Project Summary (limited to one page):** Each proposal must contain a summary of the proposed project not more than one page in length. The Project Summary must include three separate sections labeled with the following headers: Overview, Intellectual Merit, and Broader Impacts. To be valid, a heading must be on its own line with no other text on that line. The Project Summary should be written in the third person, informative to other persons working in the same or related fields. It should not be an abstract of the proposal. Do not include proprietary information in the Project Summary.

Overview
The Overview section should include a concise statement of purpose with respect to the overarching regional, national, societal and/or geostrategic, technical R&D area(s) of focus and anticipated regional importance and economic impact. The Overview should describe the potential key outcome(s) of the proposed Engine, e.g., in terms of use-inspired R&D, innovation activities, translation outcomes (e.g., products, startups, processes, or services), and inclusive regional workforce and economic development. The overview should also outline the key industries and technology areas that will be advanced and impact national competitiveness.

Intellectual Merit
This section must begin with "This proposed NSF Engine..." The section must address the intellectual merits of the proposed NSF Engine. Briefly describe the goals, broad challenges, and scientific and engineering hurdle(s) that will be addressed by the proposed use-inspired R&D, technology development and commercialization, and a high-level summary of the strategic plan to build a sustainable innovation ecosystem to reach those goals.

Broader Impacts
This section must discuss the expected measurable outcomes in terms of how the proposed Engine will build and catalyze an inclusive innovation ecosystem within the region of service and the anticipated regional impact and benefits to stakeholders and communities. Also describe the potential impact that the proposed NSF Engine will have on accelerating regional economic development and supporting broad and inclusive community wealth building.

After the required sections above, the one-page project summary must also include the following required information in this order and using these headings.

o **Overarching Challenge:** Challenge 1, Challenge 2, Challenge 3: In decreasing emphasis, list up to three key words or phrases that identify the overarching societal, regional, national, and/or geostrategic challenges (s) that will be addressed by this proposal.

Example:
Overarching Challenge(s): Resilient Food Systems

o **Keywords:** Keyword-1, Keyword-2, Keyword-3, Keyword-4, Keyword-5: In order of decreasing emphasis, list up to five keywords that represent the key technology focus area(s) to be addressed by this proposal. Find examples of key technology areas here.

Example:
Keywords: Biotechnology, advanced computing and semiconductors, advanced materials, advanced communications, artificial intelligence.

- **Industry Sectors:** Industry 1, Industry 2, Industry 3: In order of decreasing emphasis, list up to three industry sectors that will be impacted by the advancements and technology outcomes resulting from the proposed Engine's efforts. Use the four-digit North American Industry Classification System (NAICS) code for each sector from the 2022 NAICS Manual.

  Example:
  Industry Sectors: 1111 (Oilseed and Grain Farming), 5417 (Scientific Research and Development Services)

3. **Table of Contents:** A Table of Contents is automatically generated for the proposal. The proposer cannot edit this form.

4. **Project Description(up to 30 pages):** Project descriptions must include the clearly labeled sections described below. NOTE: Per the PAPPG, hyperlinks (URLs) must not be used in the Project Description.

    a. **Overview, Vision, and Rationale.** Describe the overall purpose and vision of the NSF Engine to develop a sustainable and inclusive regional innovation ecosystem and the specific regional, national, societal, and/or geostrategic challenge(s) to be addressed. Describe how the proposed region is well-positioned to become a national leader in the proposed use-inspired R&D topic area and why this is the right time and place to create the proposed NSF Engine. Discuss the current state of practice and the major gaps that the NSF Engine is aiming to address in its R&D technology focus area. Describe how the proposed NSF Engine will function as an interdependent regional network.

      Broader Impacts
      IMPORTANT: The Project Description also must contain, as a separate section within the narrative, a section labeled "Broader Impacts", and "Broader Impacts" must appear as a heading on its own line, with no other text on the line, including heading number. This section should provide a discussion of the broader impacts of the proposed activities. Proposals should include the required Broader Impacts section at the end of the "Overview, Vision, and Rationale" section of the project description.

    b. **Proposing Team and Organizational Structure.** Describe the overall organizational structure, which should be illustrated with an organization chart. The section must include at least one table that lists all committed NSF Engine organizations, the core management/leadership team, and any advisory or governance boards. Personnel fulfilling core management functions should be identified along with their qualifications for these roles. Proposals must also describe the role(s) of core partners and stakeholder organizations (e.g., government, industry, entrepreneurs, capital investors, academic institutions, non-profits, community, and labor organizations) within the NSF Engine along with their relevant expertise or organizational focus. This section should elaborate on governance and management, described as a key driver in Section II.B.2.

    c. **Strategic and Implementation Plans.** Include an overall strategic plan that describes the NSF Engine's high-level goals and objectives to be accomplished by the end of years 2, 5, and 10 of the proposed Engine (corresponding to the phases shown in Section II.B.1). See Section II.B.2, which describes the strategic plan as a foundation element for an NSF Engine. The proposed plan should connect and leverage the NSF Engine's key drivers of ecosystem change in a coordinated and intentional way to elevate and transform an entire region of service into a leading innovation ecosystem in key technology areas while simultaneously addressing the chosen regional, national, societal, and/or geostrategic challenge(s).

      The following six labeled sub-sections are required (see Section II.B.3 for descriptions):

        1. Cross-sector Partnerships and Stakeholder Alignment.

        2. Use-inspired Research and Development (R&D).

        3. Translation of Innovation to Practice.

        4. Workforce Development.

        5. Inclusive Engagement.

        6. Strategic Regional Investment/Capital Investment.

Each subsection should describe the path to achieving the proposed goals through specific activities, timelines, and milestones. The plans should describe how the team will address gaps in the current ecosystem related to the key drivers of ecosystem change. As relevant, describe the state of practice and provide baseline data that characterize the ecosystem gaps in the region of service as well as specific activities and initiatives that the NSF Engine intends to support to address gaps with respect to the key drivers. Note, the seventh driver, governance and management, should have been covered in the above section b - Proposing Team and Organizational Structure.

   d. **Evaluation Plan:** Describe the evaluation plan for the various activities undertaken by the Engine. See Section II.C for information requested.

   The project description should not contain page numbers, as they will be added automatically by the Research.gov proposal intake system. The project description file has a maximum file size limit of 10 MB.

5. **References Cited:** List only references cited in the Project Description. See PAPPG Chapter II.D.2.e for instructions.

6. **Budget and Budget Justification:** The maximum annual budgets permitted for NSF Engines awards are specified in the table below. See Section V.B below for details on the preparation of the budget and budget justification.

Funding Year	Maximum Allowable Budget
1	$7,500,000
2	$7,500,000
3	$15,000,000
4	$15,000,000
5	$15,000,000
6	$20,000,000
7	$20,000,000
8	$20,000,000
9	$20,000,000
10	$20,000,000
Total	**$160,000,000**

The NSF Engine CEO is required to be working full-time on the project. NSF recognizes that to fully engage in an NSF Engine, compensation for some other senior/key personnel may require funding beyond the general NSF limit of two months of regular salary in any one year. NSF strongly encourages proposing teams to incorporate such needs within their budgets and activities, with adequate information about the reasoning in the budget justification. For example, this could include academic year support for faculty or other personnel at non-R1 institutions of higher education to carry-out specific NSF Engine activities or support for senior /key personnel at startups or non-profit organizations providing technical assistance or engineering services.

See Section V.B for additional details regarding budget and budget justification preparation instructions.

7. **Facilities, Equipment and Other Resources:** The Facilities, Equipment and Other Resources document, as described in PAPPG Chapter II.D.g, is **not** required for the NSF Engines Program. At the time of proposal submission, proposers should enter a single document with the name of Lead organization and the words "Not Applicable." Instead, "Facilities, Equipment and Other Resources" information describing existing resources, as described in the PAPPG, must be provided in the "**Existing and New Resources to be Made Available for the Project**" template as a supplementary document (See #9b below). Note that the template is requesting both existing and new resources (cash or in-kind).

8. **Senior/Key Personnel Documents:**

    a. **Biographical Sketches:** A biographical sketch must be provided separately for each individual designated as a senior/key person through use of SciENcv (Science Experts Network Curriculum Vitae). SciENcv will produce an NSF-compliant PDF version of the biographical sketch. Senior/key personnel must prepare, save, certify, and submit these documents as part of their proposal. See PAPPG instructions in Chapter II.D.2.h(i) for more detailed information, including instructions requiring individuals are required to disclose contracts associated with participation in programs sponsored by foreign governments, instrumentalities, or entities, including foreign government-sponsored talent recruitment programs.

    b. **Current and Pending (Other) Support:** Current and pending (other) support information must be provided separately for each individual designated as a senior/key person through use of SciENcv (Science Experts Network Curriculum Vitae). SciENcv will produce an NSF-compliant PDF version of current and pending (other) support. Senior/key personnel must prepare, save, certify, and submit these documents as part of their proposal. Proposers must follow the instructions in Chapter II.D.2.h(ii) of the NSF PAPPG.

    c. **Collaborators and Other Affiliations Information:** Collaborators and other affiliations (COA) must be separately provided for each individual identified as a senior/key person on the project. The COA information must be provided through use of the COA template. Proposers must follow the guidance specified in Chapter II.D.2.h(iii) of the NSF PAPPG.

    d. **Synergistic Activities:** Each individual identified as a senior/key person must provide a document of up to one-page that includes a list of up to five distinct examples that demonstrates the broader impact of the individual's professional and scholarly activities that focus on the integration and transfer of knowledge as well as its creation. Proposers should follow the guidance specified in Chapter II.D.2.h(iv) of the NSF PAPPG.

9. **Special Information and Supplementary Documentation:**

    The proposal should include applicable supplementary documents as instructed in the PAPPG. The mandatory Data Management and Sharing Plan should be uploaded to the Data Management and Sharing Plan section and the Mentoring Plan, if applicable, should be uploaded to the Mentoring Plan section. The following items are to be provided as additional supplementary documents and do not count against the 30-page limit for the project description.

    a. **Consolidated Personnel List Spreadsheet:** (Click here to access the required spreadsheet template): The Consolidated Personnel List is a spreadsheet listing all key personnel, subaward and collaborations. Using the Excel spreadsheet template, compile information for all persons identified in the proposal as CEO/PI, co-PI, Other Senior/Key Personnel, Other Personnel, who have a biographical sketch included in the proposal including Sub-recipient personnel and Collaborators for individuals who formally submitted a Letter of Collaboration. The purpose of this document is to assist the program in managing reviewer selection. If you are unsure of whether to include someone in the Personnel List Spreadsheet, err on the side of including the person. Only one spreadsheet should be submitted per proposal.

    b. **Existing and New Resources to be Made Available for the Project:** This section is used to assess how the proposed NSF Engine will leverage existing and new resources for the project. Proposers should describe only those tangible resources (e.g., cash, facilities, equipment, human capital, datasets) that are directly applicable to the proposed NSF Engine in its first two years of operation, should it be funded. Such

information must be provided in this section, and not in other parts of the proposal (e.g., Budget Justification, Project Description). Proposing teams must use the *Existing and New Resources Spreadsheet Template* to record resources committed to the proposed Engine. See the instructions within the template.

Although the resources described are not voluntary committed cost sharing as defined in 2 CFR §200.1, the Foundation does expect that the resources identified in this section will be provided, or made available, should the proposal be funded. PAPPG Chapter VII.B.1 specifies procedures for use by the recipient when there are post-award changes to objectives, scope, or methods/procedures.

Within this section, proposers should describe the resources in the following two distinctly labeled categories. In both categories, include only those resource contributions (e.g., cash, facilities, equipment, human capital, datasets) that will support and advance the NSF Engine's strategic goals.

- **Currently Available Resources:** Provide information on the relevant currently existing resources available to the proposing team from internal and external sources, including all partner organizations. If a resource has already been contributed to an ongoing collaboration among a subset of the NSF Engine's participating organizations and partners, describe what percentage of that resource will be available solely for the Engine's activities. Proposers should briefly summarize how these resources will be allocated to specific activities described in the Project Description.

- **New Resource Contributions:** Provide information on new resource contributions committed by external sources, as stated in their letters of collaboration. New resource contributions that are not documented in a letter of collaboration should not be included here. Proposers should briefly summarize how these new resources will contribute to activities described in the Project Description. *Proposing teams will be asked to provide a detailed listing of committed contributions (including cash and an accurate valuation of in-kind commitments) at various stages of the review process.* Additional details will be provided during the merit review process. Proposers will be asked to provide a detailed set of actual contributions prior to receiving an award.

NSF expects that the internal and external resources provided to the NSF Engine will increase over the duration of the award thereby demonstrating increased partnership engagement, regional commitment to the long-term sustainability of the NSF Engine, and continued growth of the innovation ecosystem. During the post-award evaluation process, NSF will assess how the committed resources are contributing to the execution Engine activities and advancement of the NSF Engine's goals in the award period.

c. **Region of Service Map:** As a supplementary document, each proposing team must provide a region of service map that defines the region of service by state(s) and counties covered in a list format. Counties should be identified by both name and 5-digit FIPS codes. NSF is requesting this information to gain a more precise description of each applicant's Region of service and a more detailed view of the geographic distribution of the NSF Engines applicant pool. To facilitate a uniform process and comparable maps, the NSF Engines team has compiled a set of resources and a map builder tool to help you build out this Region of service document for your proposal. These resources include: 1) a how-to instruction guide; 2) a step-by-step video tutorial 🗗; and 3) an excel template "Region of Service Map Builder Tool-REQUIRED" with web links to the map builder tool. By following the step-by-step instructions on how to use the map builder tool, the requested data will automatically populate in the excel file template. The excel file must be converted to a PDF file and submitted in the supplementary document section of your proposal within Research.gov.

IMPORTANT INSTRUCTIONS: *These instructions below apply only to the above three supplementary documents.*

Prior to proposal submission:

1. Convert each of the three files into a separate PDF document using these file names:

    a. "Consolidated Personnel List"

    b. "Existing and New Resources Spreadsheet Template"

    c. "Region of Service Map"

2. Once completed, the files should be uploaded as three separate supplementary documents and **MUST** be submitted with the full proposal.

3. Important reminders, when uploading PDF documents via Research.gov.

- The files should not be protected or encrypted;

- The files should not be an image-only document (i.e., should contain editable text to allow software readability); and

- None of the files should be a Portfolio PDF.

After proposal submission (once a proposal ID has been assigned):

1. Rename the three Excel spreadsheets using the following naming conventions (these naming conventions MUST be used):

    a. [Proposal ID#]_[PI's last name]_Consolidated Personnel List

    b. [Proposal ID#]_[PI's last name]_Existing and New Resources Spreadsheet Template

    c. [Proposal ID#]_[PI's last name]_Region of Service Map

2. In a single email message, send the three Excel spreadsheets named as indicated above (as attachments) to engines@nsf.gov. That is, send a single email message with three attachments.

3. The subject line for the email MUST be [Proposal ID#]: NSF Engines Proposal

NOTE: *Teams must complete the above instructions within 24 hours of submitting their proposal. Proposals that fail to submit the above supplementary documents as part of the proposal and via email may be returned without review.*

d. NSF Engine Development Award Information: If the proposing team and/or a core partner organization received an NSF Engines Development Award(s), the following information must be submitted as a supplementary document. If there was more than one award, please list them consecutively in the document.

- **NSF Engine Development Award Title(s):** Include the full title of the development award, separated by a semi-colon if the proposing team included more than one development award (e.g., two or more development awardee teams have merged).

- **NSF Engine Development Award ID (s):** Include only the 7-digit award ID, separated by a semi-colon if there is more than one.

- **Name of PI for the Development Award (s):** PI Last Name, PI First Name; separated by a semi-colon if there is more than one.

- **Lead Organization for the Development Award (s):** Organization Name; separated by a semi-colon if there is more than one.

e. **Lead Organization for the Award Seeking and Obtaining Tribal Nation Approval for Proposals that May Impact Tribal Resources or Interests:** Proposals that may impact the resources or interests of a federally recognized American Indian or Alaska Native Tribal Nation (Tribal Nation) will not be awarded by NSF without prior written approval from the official(s) designated by the relevant Tribal Nation(s). Proposers must follow the guidance specified in Chapter II.E.10 of the NSF PAPPG.

f. **Letters of Commitment and Collaboration**

- **Letter of Commitment from the Lead Organization:** A letter of commitment from a senior official of the lead organization (e.g., IHE President, CEO for-profit industry) must be submitted which describes the support for and commitment to the proposed NSF Engine should it be funded

(including physical space for the Engine headquarters and other resources). For this requirement, the letter of commitment from the lead organization that was submitted as a requirement with the preliminary proposal may be resubmitted with a new date and signature, and should be updated to reflect any necessary changes, including those in response to the merit review process. The purpose of this letter is to demonstrate the Lead Organization's full support for the proposed Engine and its commitment to maximizing the proposed Engine's impact in the region. This letter should NOT include any financial commitments. Instead, the senior official should make a statement as to how the proposed NSF Engine and the key drivers of ecosystem change align with the strategic directions of the Lead organization and outline demonstrable ways in which the lead organization will support the NSF Engine's mission of catalyzing an inclusive sustainable innovation ecosystem within the region of service. Proposals submitted without a letter of commitment from the senior official of the Lead organization will be returned without review. This letter is limited to two pages.

- **Letters of Collaboration:** Full proposals must include letters of collaboration from all core partners and from all other stakeholders who are providing substantive assistance, resources, or collaboration to the proposed Engine project. Letters of collaboration from core partners must be signed by the senior official of the lead organization (e.g., IHE President, CEO for-profit industry) and must demonstrate the core partner's full support for the proposed Engine and its commitment to maximizing its impact in the region of service. Letters of collaboration from core partners and key stakeholder organizations are expected to demonstrate a commitment to actively engage in the NSF Engine's leadership, operations, governance and/or programmatic activities. Letters of collaboration should be signed by a senior official (or his/her designee) of the partner or stakeholder organization and should verify the nature of partner's or stakeholder's participation and specify the resources (cash and/or in-kind) that they are committing to or will make available to the proposed Engine, should the proposal be awarded. The letters should demonstrate support for the proposed NSF Engine in the region of service and describe how the stakeholder organization's strategic directions align with the key drivers of ecosystem change and regional priorities. Letters of collaboration are limited to one page. There is no limit on the letters of collaboration that can be submitted with a full proposal.

The letter of commitment and all letters of collaboration must end with the following text:

By signing below, I acknowledge that I, or my organization, will collaborate and/or commit resources as detailed in the proposal, entitled "_____". I, or my organization, agree to undertake the tasks described, and commit to contribute or make available the resources described in the Project Description or the Existing and New Resources to be Made Available for the Project section of the proposal.

Signed: _____ Print Name: _____

Date: _____ Organization: _____

There is no limitation on the number of letters of collaboration. If applicable, the 4-6 letters of collaboration submitted with the preliminary proposal should also be included and should be updated if appropriate.

Letters of support or endorsement for the project are not accepted.

g. **Data Management and Sharing Plan** (*up to two pages*): Within the Data Management and Sharing Plan, proposing teams must address their plans for data-sharing across their team, across the topic areas with other teams, and with the public, during the project and after its completion. See PAPPG Chapter II.D.2.i(ii) for additional guidance.

h. **Invitation to submit Full Proposal:** Full proposals must include an invitation email from an NSF Engines Program Officer inviting submission after the review of the preliminary proposal. Proposals submitted

without this letter will be returned without review.

i. **Mentoring Plan:** (if applicable, *up to one page*) As described in PAPPG Chapter II.D.2.i(i), each proposal that requests funding to support postdoctoral scholars or graduate students must upload a description of the mentoring activities that will be provided for such individuals. Note that the NSF Engines program differs in duration and goals from traditional academic research efforts. The Mentoring Plan should reflect how mentoring will be appropriate for the specific roles of postdoctoral scholars or graduate students in this project effort.

j. **Shared Infrastructure:** (if applicable, *up to three pages*) If the NSF Engine plans include the development of shared research facilities (i.e., any facility that will not be used exclusively for NSF Engine activities), then include a Shared Infrastructure document that describes plans to build, manage, and sustain such facilities.

10. **Additional Single Copy Documents for Full Proposals**

The following documents must be marked with a header "Single Copy Document." These documents will not be shared with the reviewers of the proposal.

a. **Mandatory Disclosure:** NSF reserves the right to publish or otherwise make available a summary of a subset of, or all, the submitted LOIs, the associated preliminary and/or full proposal information at any time between the time of submission of the LOI and the time of announcement of NSF Engines awards. Such summaries may include the following information about each proposal: (1) submission title, (2) lead organization name and organization type, (3) geographical information provided by proposers about the region of service, (4) name and contact information of the CEO (or current PI, if a CEO has not yet been determined), (5) topic area, (6) key technology areas, and (7) a brief description of the proposal, not to exceed 5 sentences. NSF also reserves the right to announce these summaries for a subset of proposals that are under consideration during the different stages of the merit review process, including, but not limited to, the pre-proposal stage and the site visit stage.

For Privacy Act Purposes, proposers are required to submit a disclosure statement with only the following text: "I, [insert PI's name], hereby consent to the disclosure of a summary of my NSF Engines proposal as described in the NSF Engines Solicitation."

Proposals submitted without this disclosure statement uploaded as a Single-Copy Document will be returned without review.

b. **Proprietary Data Restrictions:** *(if applicable)* Proposers are advised that proposals for any or all types may contain data the proposer does not want disclosed to the public for any purpose or used by the Federal Government except for evaluation and assessment purposes. If the proposer wishes to restrict such data, the cover page of all such documents must be submitted as a single copy document, marked with the following legend:

This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed – in whole or in part – for any purpose other than to evaluate this proposal. However, if an award is awarded to this proposer as a result of – or in connection with – the submission of these data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting award. This restriction does not limit the Government's right to use information contained in these data if they are obtained from another source without restriction. The data subject to this restriction are contained in Sheets [insert numbers or other identification of sheets].

Each restricted data sheet shall be marked as follows:

Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this document. To the extent that such restrictions on proprietary data or information would not interfere with the intent of the Government to make the results of the work and projects awarded under the Solicitation available to all

interested parties, and if in conformance with the Freedom of Information Act (5 U.S.C. 552, as amended), the Government will honor those desires.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Infrastructure: No more than 25% of the total NSF budget for the award performance period may be used to construct or upgrade infrastructure assets, including any associated indirect costs (F&A). These costs, if included, should include all building construction as well as design and engineering services, and on-site costs, e.g., prep costs including cleanup, legal services, etc. Space outfitting items for existing or new spaces, such as furniture, should also be included in the total. If any portion of the budget is allocated for infrastructure, then the proposal must include, in the budget justification, a plan for supporting operations and maintenance of the asset(s) using funds other than from the NSF Engines award. Any request for budget contingency must comply with paragraph § 200.433 of the Uniform Guidance. and follow the guidelines in the most current version of the NSF Research Infrastructure Guide (RIG). This includes a separate contingency budget that is justified and fully supported through a formal risk assessment and a Risk Management Plan. An allowance in lieu of budget contingency may be more appropriate.

Indirect Cost (F&A) Calculations: The applicable U.S. federally negotiated indirect cost rate(s) must be used in computing indirect costs (F&A) for the proposal. Proposers must follow the instructions in Chapter II.D.2.f.viii of the NSF PAPPG, which provides instructions on how to calculate the amount of the indirect cost for organizations with or without a current negotiated indirect rate agreement.

Budget Preparation Instructions:

Proposers are required to submit budgets with their full proposals, including specific dollar amounts by budget category, for the lead and all proposed sub-recipients The amounts for each budget line item requested MUST be documented and justified in the budget justification as specified in the PAPPG. The proposed budget should reflect the needs of the proposed NSF Engine. The budget should be prepared in accordance with the guidance in PAPPG Chapter II.D.2.f, which requires each proposal to include a budget for each year of support requested.

For this solicitation, a detailed budget is required for the first two award years only. No costs should be entered on the budget forms in Research.gov for years 3-10. As part of this detailed budget for years 1 and 2, separate budgets and budget justification documents must be provided for subawards to the core partner organizations and any affiliated organizations whose technical personnel, consultants, administrative staff, faculty, and/or students would be supported by the budget.

Other Budgetary Requirements:

Budgets for all projects must include funding for the CEO and a limited number of Senior/Key Personnel to attend at least two meetings per year organized by the NSF Engines program at locations within the U.S. It should also be noted that the NSF Engines program will host several training activities focused on catalyzing and growing thriving regional scale innovation ecosystems. Members of each NSF Engine's leadership team must attend all required training activities, which may include virtual and in-person events. Details on the expected time commitment and participation levels will be provided by NSF to award recipients after the completion of the merit review process.

Although many proposals submitted in response to this solicitation will include the participation of for-profit organizations, NSF proposal budgets may not include profit or fees.

The overall NSF Engine budget should be developed to ensure that funding is sufficient to achieve the Engine goals. Budgets should also include necessary resources for reporting, and travel for Engine-wide collaboration and NSF meetings. The budget submitted to NSF should only reflect NSF funding for the Engine.

C. Due Dates

- **Letter of Intent Due Date(s)** *(required)* (due by 5 p.m. submitting organization's local time):

  June 18, 2024

- **Preliminary Proposal Due Date(s)** *(required)* (due by 5 p.m. submitting organization's local time):

  August 06, 2024

- **Full Proposal Deadline(s)** (due by 5 p.m. submitting organization's local time):

  February 11, 2025

  > Only invited teams are eligible to submit full proposals. Teams can expect to receive invitations to submit full proposals in mid-October 2024. This is a tentative timeline and is subject to change based on the number and quality of received proposals.

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop? _nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationa For Research.gov user support, call the Research.gov Help Desk at 1-800-381-1532 or e-mail rgov@nsf.gov. The Research.gov Help Desk answers general technical questions related to the use of the Research.gov system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: https://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to Research.gov for further processing.

The NSF Grants.gov Proposal Processing in Research.gov informational page provides submission guidance to applicants and links to helpful resources including the NSF Grants.gov Application Guide, Grants.gov Proposal Processing in Research.gov how-to guide, and Grants.gov Submitted Proposals Frequently Asked Questions. Grants.gov proposals must pass all NSF pre-check and post-check validations in order to be accepted by Research.gov at NSF.

When submitting via Grants.gov, NSF strongly recommends applicants initiate proposal submission at least five business days in advance of a deadline to allow adequate time to address NSF compliance errors and resubmissions by 5:00 p.m. submitting organization's local time on the deadline. Please note that

some errors cannot be corrected in Grants.gov. Once a proposal passes pre-checks but fails any post-check, an applicant can only correct and submit the in-progress proposal in Research.gov.

Proposers that submitted via Research.gov may use Research.gov to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF Proposal Processing And Review Procedures

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Leading the World in Discovery and Innovation, STEM Talent Development and the Delivery of Benefits from Research - NSF Strategic Plan for Fiscal Years (FY) 2022 - 2026*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.D.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.D.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
   a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
   b. Benefit society or advance desired societal outcomes (Broader Impacts)?

2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?

3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?

4. How well qualified is the individual, team, or organization to conduct the proposed activities?

5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and other underrepresented groups in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management and Sharing Plan and the Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

3. Additional Review Criteria for Preliminary Proposals

Preliminary proposals will be reviewed by ad hoc reviewers and/or external panel. Reviewers of preliminary proposals will be asked to consider the following criteria.

- **Vision and Scope:** The team's shared vision for the proposed Engine and inclusive regional innovation ecosystem will be evaluated with respect to the programmatic goals and how the proposed Engine fits with the capacity, resources, and needs of the region of service.

- **Technology Innovation Plans:** The chosen topic area, the proposed innovation in key technology focus areas, and the translation plans that are the foundation of the Engine's activities will be evaluated with respect to their potential regional, national, societal, and/or geostrategic impacts as well as their potential to catalyze inclusive economic growth.

- **Region of Service:** The region of service will be evaluated for its competitive advantage and the rationale for its geographic boundaries with respect to the topic area, the size of its service area and population density, the likelihood of building a sustainable innovation economy in the region, and the region's potential for transformative outcomes, across all drivers of ecosystem change, that can be measured and assessed through the 10-year period of the award.

- **Key Partners and Stakeholders:** The key partnerships will be evaluated according to their capacity to meet the stated needs for the proposed topic area that would lead to a successful ecosystem in a particular region of service, including the level of the cross-sector engagement, commitments made and strategies for engaging and developing an interdependent network of partners and stakeholders.

- **Strategy to Address Ecosystem Gaps:** The strategy to address existing gaps in the region's current innovation ecosystem will be evaluated for its likelihood of resulting in an interdependent network and the realism of risk mitigation strategies including how the team would pivot if needed.

4. Additional Review Criteria for Full Proposals

Teams invited to submit a full proposal should note that full proposals must be self-contained documents. Full-proposal reviewers will not have access to the previously submitted preliminary proposals. The preliminary proposal review will

have evaluated the Engine's technology innovation, the region's competitive advantage, and the proposing team's qualifications to lead. The full proposal must expand on the preliminary proposal submission and address how the team will achieve its goals and drive ecosystem change in the region of service. Full proposals will be evaluated independently of the preliminary proposals by a new set of reviewers. In addition to intellectual merit, broader impacts, and the four criteria from the review of preliminary proposals, full proposals will be evaluated on how they address the following five additional criteria:

- **Leadership Team:** The leadership team will be evaluated for its experience, vision, plans for inclusion, and sufficient authority for decision-making and implementing key drivers of ecosystem change within the Engine and among its core partners and regional stakeholders.
- **Workforce Development:** The vision for workforce development and plans for relevant workforce development activities in the region of service will be evaluated based on quality of partnerships, resource allocations, plans to reach diverse untapped populations, co-design efforts that engage with regional stakeholders and communities, and a plan for recruiting, training, and retaining diverse workers.
- **Resources and Investment Capital:** Resources and the plan to attract additional outside investment capital to the region and the Engine's specific industry during and after the period of the award will be evaluated on the quality and diversity of the stakeholder coalition, the capacity for growth in the region of service, evidence of new resources already committed, and plans for sustaining the Engine into the future.
- **Inclusive Culture:** The commitment to foster an inclusive culture in all Engine activities will be evaluated on the strategy for building a leadership team, inclusive engagement of stakeholders, the realism of the plans to broaden participation and bring untapped talent into the innovation ecosystem, and clear plans and resource allocations to expand the interdependent regional network into new communities and geographies within the region of service.
- **Risk Assessment and Mitigation:** Evaluation will focus on the approaches to risk assessment and risk mitigation for the Engine beyond the period of NSF funding, including the current competitive landscape in industry and the region of service for the chosen topic and support structures to allow team leadership to move quickly at speed and scale to adapt to evolving conditions.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, Site Visit Review, or Reverse Site Review.

The NSF Engines competition will include a four-stage merit review process:

- Stage 1: Preliminary Proposal Review
- Stage 2: Full Proposal Panel Review
- Stage 3: Reverse Site Visit
- Stage 4: Site Visit

At each stage, a subset of the most meritorious proposals will move to the next stage. The purpose of the Reverse Site Visits will be to gain further understanding of the regional coalition, the alignment of the leadership team and core partners, the vision for R&D and translation activities, and to discuss any proposal-specific concerns that remain after the panel review in stage two. The teams that advance to the Site Visit stage will be asked to bring their partner coalition together and highlight regional assets for an on-site review conducted by NSF personnel and external review panelists. Based on the number and quality of proposals, NSF reserves the right to modify the number of review stages.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new recipients may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements or the Division of Acquisition and Cooperative Support for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. Award Administration Information

A. Notification of the Award

Notification of the award is made to *the submitting organization* by an NSF Grants and Agreements Officer. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

Administrative and National Policy Requirements

Build America, Buy America

As expressed in Executive Order 14005, Ensuring the Future is Made in All of America by All of America's Workers (86 FR 7475), it is the policy of the executive branch to use terms and conditions of Federal financial assistance awards to maximize, consistent with law, the use of goods, products, and materials produced in, and services offered in, the United States.

Consistent with the requirements of the Build America, Buy America Act (Pub. L. 117-58, Division G, Title IX, Subtitle A, November 15, 2021), no funding made available through this funding opportunity may be obligated for an award unless all iron, steel, manufactured products, and construction materials used in the project are produced in the United States. For additional information, visit NSF's Build America, Buy America webpage.

Special Award Conditions:

Post-Award Assessment

NSF may elect to appoint an external assessment team to assist NSF with monitoring and assessment of an NSF Engine awardee's performance.

For an award, NSF expects to assess the NSF Engine's operations at the end of Years 1, 2, 4, 5, 7, and 9 from the start date of the award. The review will assess progress relative to the goals specified in the cooperative agreement. Each assessment will include a review of the progress report submitted by the NSF Engine and may include a site visit from NSF and/or an external review committee. Additional NSF Engine funding for the years after an assessment is contingent upon its performance. NSF reserves the flexibility to require additional intermediate assessments.

For awards, resource commitments made by participating organizations and other partners of an NSF Engine and the utilization of such resources will be a factor in the assessment process. Where applicable, assessment will also include the extent to which an NSF Engine has incorporated ethical, social, economic, health, legal, safety, and environmental considerations that are relevant to activities of the NSF Engine.

Continued Funding Decisions for NSF Engine Awards: Continued funding will be based on a combination of the annual reporting by the awardees, evaluation and review at the set times noted above, and may also include input from an external evaluator. The cognizant program officer, working with the NSF Engines post-award management team, will sign off on the obligation of funds on an annual basis. Continued funding is not guaranteed and requires the awardee to meet all performance requirements described and agreed to in the cooperative agreement. NSF Engine awardees should be aware that continued funding also depends heavily on the availability of funds to the NSF Engines Program.

If an NSF Engine is not meeting performance requirements, NSF will work with the awardee to mitigate the issues. During this mitigation period, NSF may engage in more frequent assessments, including site visits, as necessary. If the NSF Engine is unable to resolve performance issues within a specified time period, NSF funding will be discontinued. The NSF Engines Program team may continue to work with the Engine to meet its overall goals for the proposed region of service. The details of a mitigation period and/or ramp-down will be subject to negotiation between NSF and the awardee under the terms of the cooperative agreement.

Intellectual Property Rights

Awards will generally contain detailed provisions concerning patent rights, rights in technical data and computer software, data reporting requirements, and other terms and conditions which may be negotiated as part of the award process.

For an award, the awardee organization must submit an Intellectual Property (IP) Management Plan to NSF within nine months of award date. IP Management Plans are not to be submitted at the time of proposal submission. All awardees will be required to submit a formal IP Management Plan within six months of the award date.

Partnerships that facilitate the research effort and transition of research results to practice are key elements of the NSF Engines Program. As such, a clear IP Management Plan is essential for current and future partnerships. Both ownership and management of IP should be addressed in the IP Management Plan. The plan should include (1) IP contributed by partners included in this proposal, (2) IP that may be developed during the project, and (3) a plan for access to IP from (1) and (2) by potential future partners. All appropriate agreements will be required no later than six months after award

date. *While IP Management plans are not required at the time of proposal submission, NSF recognizes that completing such agreements often requires significant time, and strongly encourages proposing teams to begin fleshing out the details of all appropriate agreements early in their teaming process to ensure that the team can meet the six-month deadline.*

Commitments from partner organizations for sharing of resources (such as data, research instrumentation, or any other required elements for carrying out the proposed work) can be described within the Existing and New Resources to be Made Available for the Project Section; Formal agreements are required within six months of the award date.

Foreign Collaboration Considerations

1. Consideration of new collaborations with international organizations. The awardee will be required to provide the cognizant NSF Program Officer and Grants and Agreements Officer with advanced written notification of any potential collaboration with international organizations or governments in connection with its NSF-funded award scope. The awardee will then be required to await further guidance from NSF prior to further contacting the proposed international organization regarding this potential collaboration or negotiating terms of any potential agreement. Advance notification to NSF will require the inclusion of a description of the intended scope of the potential collaboration; how it contributes to the mission of the NSF Engine; the organizations proposed to be involved; the duration of the effort; any possible NSF Engine access or exchange of non-public data; provisional concepts of governing structures; the associated benefit to the U.S. scientific community; or other thing of value. Following initial NSF guidance, if negotiations commence, the awardee will be required to notify NSF of any changes that were not incorporated when NSF provided its original guidance and await further guidance before reaching final agreement.

2. Existing collaborations with international organizations. The awardee will be required to provide the cognizant NSF Program Officer and Grants and Agreements Officer with a written list of all existing foreign collaborations in which it has entered in connection with its NSF-funded award scope, detailing the scope of the agreement, participants thereto, duration, location, and the value or level of effort provided by the awardee. The awardee will be required to provide NSF with notice of any pending changes or developments that modify the information in this list.

3. Description of collaborations that should be reported: In general, a collaboration will involve some provision of a thing of value to, or from, the NSF facility or awardee. A thing of value includes but may not be limited to all resources made available to, or from, the awardee in support of and/or related to the NSF award, regardless of whether or not they have monetary value. Things of value also may include in-kind contributions (such as office/laboratory space, data, equipment, supplies, employees, students). In-kind contributions not intended for direct use on this award but resulting in provision of a thing of value from or to this award also must be reported. Collaborations do not include routine workshops, conferences, use of the awardee's services and facilities by foreign investigators resulting from its standard published process for evaluating requests for access, or the routine use of foreign facilities by awardee staff in accordance with the awardee's standard policies and procedures.

Research Security

1. Awardees will be responsible for establishing and maintaining oversight over the security of the NSF Engine's research activities, results, and shared resources. Within six months of the award, the awardee organization must submit a comprehensive research security plan for review by the NSF Chief of Research Security Strategy and Policy. The research security plan must include, at a minimum, the following elements:
    1. Cybersecurity protocols, procedures, and training;
    2. Foreign travel security policies and processes;
    3. Research security training; and
    4. Export control training.

    The awardee must designate a member of the NSF Engine's leadership team as the research security point of contact with responsibility for implementation and oversight of the research security plan.

2. Following approval of the research security plan, NSF will conduct regular reviews of the research security efforts of the NSF Engines and their participating organizations.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final annual project report, and a project outcomes report for the general public.

Failure to provide the required annual or final annual project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final annual project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

NSF Engines Additional Reporting Requirements

Subject to the appropriate approvals, the NSF Engines program will require interim reports at various stages of an NSF Engine award. The reporting requirements will include: (1) Quarterly Reports; (2) a 5-year strategic and implementation plan; and (3) annual evaluation reports. The expected content of the above reporting requirements and any other reporting requirements will be specified in the cooperative agreement of the award.

Resource Commitment and Utilization Reporting

As part of each NSF Engine's annual project report, the lead organization should update the resources contributed by internal and external sources towards its activities. Specifically, for each contribution, the lead organization must specify the source, nature of the contribution (e.g., funds, expertise, access to testbeds, data sets), estimated total amount of contribution to date, total usage of contributed resources to date, new contributions made during the most recently completed year, and usage of resources during the most-recently completed year. This breakdown of contributions should indicate progress toward achieving the contributions anticipated in the original proposal, plus additional contributions beyond those. NSF considers growing contributions to the NSF Engine over time as a critical indicator of the Engine's success, reflecting the value-add of the NSF Engine to its region and long-term sustainability.

Program Income Reporting Requirements

On an annual basis, the lead organization will be required to submit a "program income reporting worksheet" to NSF in order to report program income earned and expended for their award or to validate that the project did not earn and expend program income during the applicable period. Additional information regarding this requirement is available in PAPPG Chapter VIII.D.4.

Failure to report program income or to validate that no program income was earned/expended could result in suspension of future cooperative agreement payments.

VIII. Agency Contacts

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- NSF Engines Program Team, telephone: (703) 292-7463, email: engines@nsf.gov

For questions related to the use of NSF systems contact:

- NSF Help Desk: 1-800-381-1532
- Research.gov Help Desk e-mail: rgov@nsf.gov

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. Other Information

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at https://www.grants.gov.

About The National Science Foundation

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures*

Guide Chapter II.F.7 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.
To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at https://www.nsf.gov

- **Location:**   2415 Eisenhower Avenue, Alexandria, VA 22314

- **For General Information**   (703) 292-5111
  (NSF Information Center)**:**

- **TDD (for the hearing-impaired):**   (703) 292-5090

- **To Order Publications or Forms:**

    Send an e-mail to: nsfpubs@nsf.gov

    or telephone: (703) 292-8134

- **To Locate NSF Employees:**   (703) 292-5111

Privacy Act And Public Burden Statements

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by proposers will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding proposers or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See System of Record Notices, NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Policy Office, Division of Institution and Award Support
Office of Budget, Finance, and Award Management
National Science Foundation
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Vulnerability disclosure | Inspector General | Privacy | FOIA | No FEAR Act | USA.gov | Accessibility |
Plain language |

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